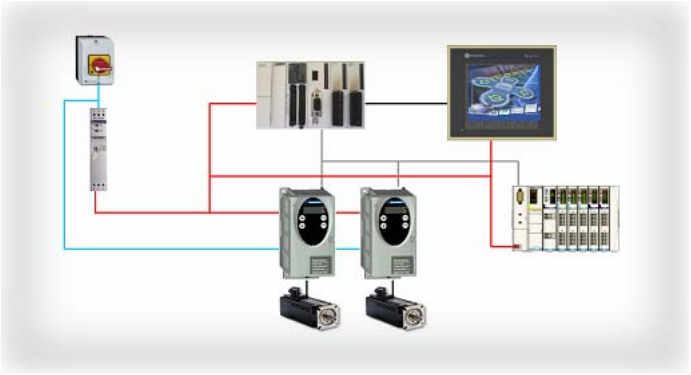
Twido and Lexium Magelis and Advantys

System User Guide

[source code]



33003565.02

Merlin Gerin
Square D
Telemecanique

Schneider Electric
Building a New Electric World

Contents

Introduction

This document is intended to provide a quick introduction to the described System.
It is **not** intended to replace any specific product documentation. On the contrary, it offers additional information to the product documentation, for installing, configuring and starting up the system.

A detailed functional description or the specification for a specific user application is **not** part of this document. Nevertheless, the document outlines some typical applications where the system might be implemented.

Abbreviations

Word/Expression	Explanation
PLC	Programmable Logic Controller
HMI	Human Machine Interface
PC	Personal Computer
AC	Alternating Current
DC	Direct Current
PSU	Power Supply Unit
I/O	Input/Output
VSD (VVD)	Variable Speed Drive (Variable Velocity Drive)
CB	Circuit Breaker or motor protection
Twido	Name of a small Schneider Electric PLC
TwidoSoft	Name of Schneider Electric PLC programming software
Phaseo	Name of a Schneider Electric range of power supply units
Magelis	Name of a Schneider Electric range of HMIs
Lexium/Lexium05	Name of a Schneider Electric range of servo drives
Advantys	Name of Schneider Electric I/O modules

Application Source Code

Introduction

Examples of the source code used to attain the system function as described in this document can be downloaded from our „Village“ website under **this** link.

Typical applications

Introduction The following chapter describes some typical applications or partial applications for this system.

Application	Description	Example
Packaging machines	In the packaging industry, for labeling, packaging, filling and palletizing goods	
Special-purpose machines	Used on small special-purpose machines for assembly, processing, cutting operations, etc. (e.g. food preparation, automated assembly, wood machining).	
Material conveyors	Used in connection with transportation tasks that involve “pick and place” operations.	

System

Introduction

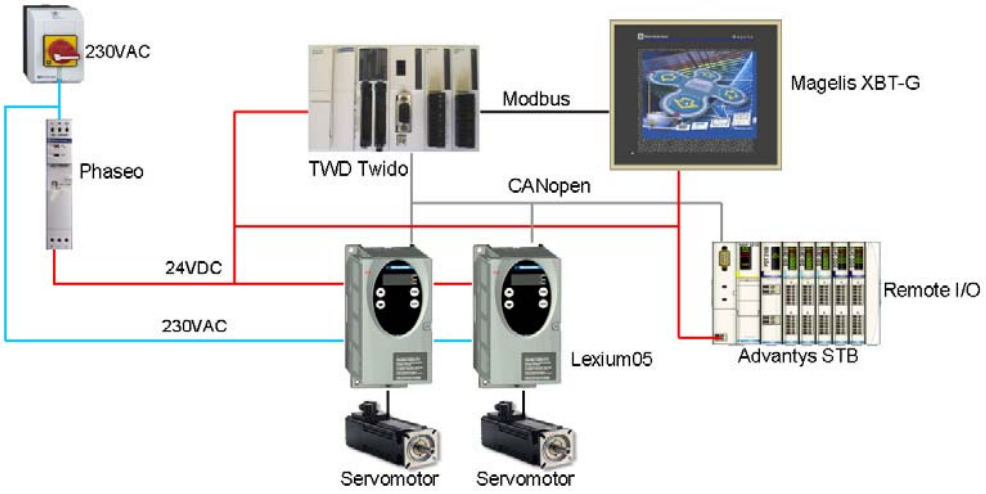
This section describes the architecture, components, size and number of the components that are used within this system.

Architecture

Overview

The system consists of a PLC that controls two drive controls, each with a servo drive, and a remote I/O platform. The drives can be operated via a graphic touch panel. The field bus level operates with CANopen and the control level operates with Modbus. A master switch ensures safety.

Layout



Components

Hardware:

- Twido (PLC)
- Phaseo (power supply)
- Lexium05 (drive control)
- Advantys STB (remote I/O)
- Magelis XBTG (HMI)
- Servo motor

Software:

- TwidoSoft 3.2 (PLC)
- Advantys configuration software 1.20 (remote I/O)
- Vijeo-Designer 4.2.0 (HMI)
- PowerSuite 2.0 (Lexium05)

Dimensions

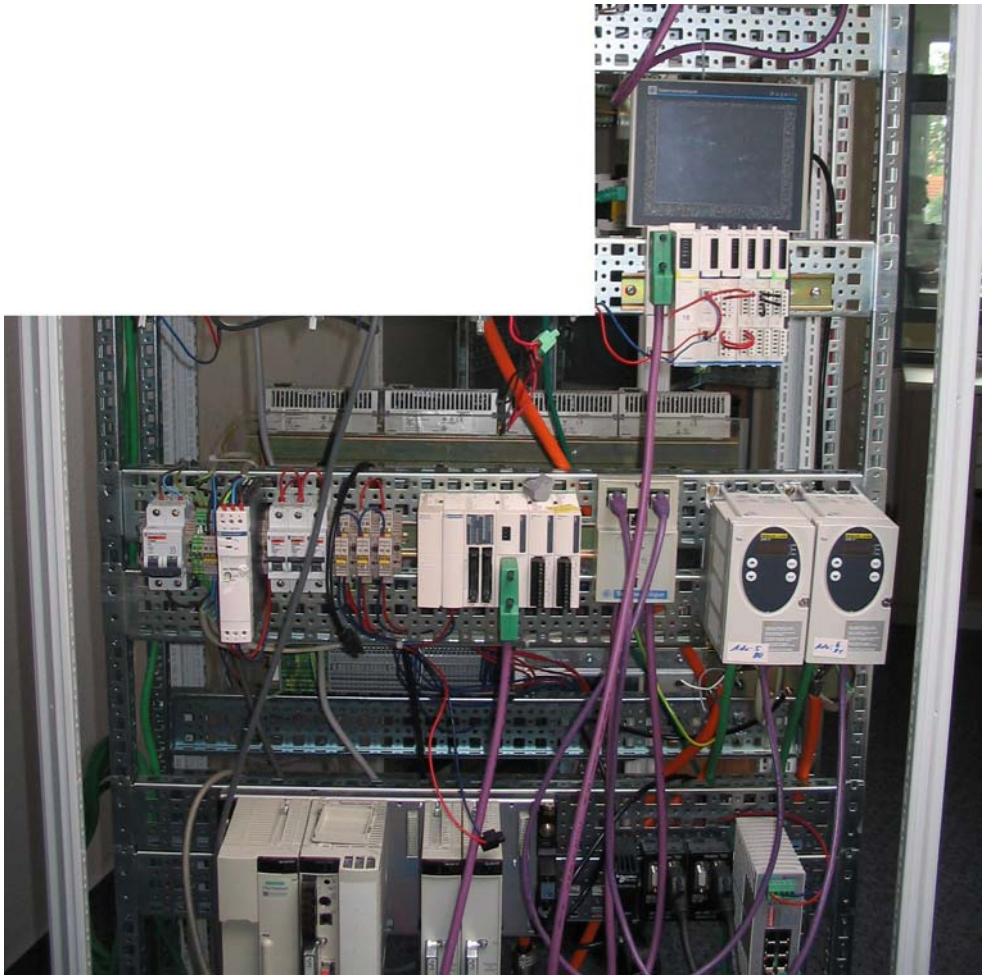
The compact size of the individual components means that it is possible to house them in a control cabinet with the following approximate external dimensions: 700 x 500 x 250 mm (WxHxD). The XBTG can be installed in the front door for operation there.

Installation

Introduction

This section describes the steps required for the hardware setup and software configuration for the following application.

Layout



Note

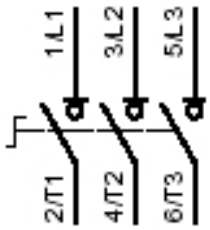
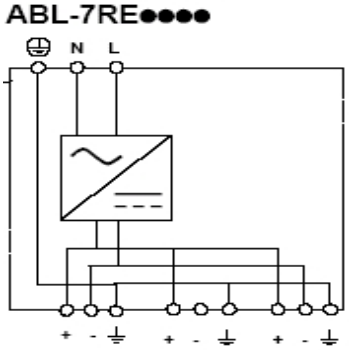
Configuration of this application has not been developed for any special actual use. It is intended to show how the system components work together as a unit.
The components that are listed are a cross-section of the components needed for control and display in possible applications.
This SMD does not claim to be comprehensive and **does not absolve users** from their duty to check the safety requirements of their equipment and to ensure compliance with the relevant national or international standards and regulations.

Hardware

General

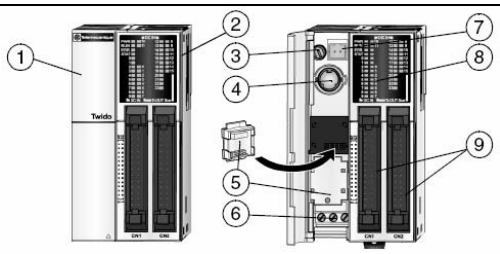
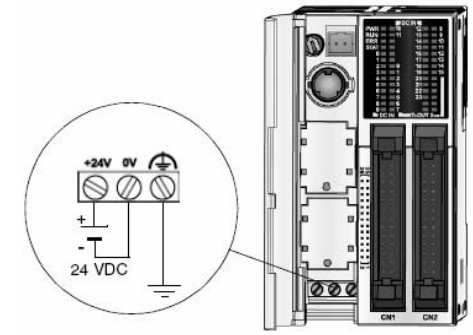
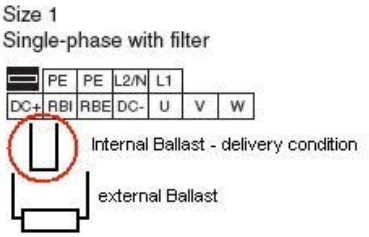
- For assembly purposes, the Twido, power supply and Advantys STB require a top-hat rail.
- The other devices can be attached directly to the mounting plate.
- A 230 V AC wiring is used between the main switch, power supply and VSD.
- A 24 V DC wiring is used between the power supply, PLC, HMI and VSD control unit.
- There are other cables from the power cables and feedback cables between the motor and the VSD.

Components

Master switch VCF-02GE		
Power supply ABL7RE2403		

Continued on next page

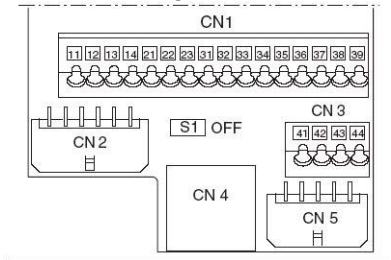
Components, continued

Twido PLC **TWDLMDA40DTK**		 1 Hinged cover 2 Extension connector 3 Analog potentiometer 4 Serial port 1 5 Module cover 6 24 V DC power supply terminals 7 Analog voltage supply connector 8 LEDs 9 I/O terminals
Twido PLC **TWDLMDA40DTK** **Power supply**		
Drive control **Lexium05** **LXM05AD10M2**		• AC and motor connection 

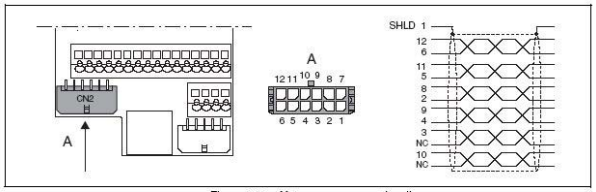
Connections	Meaning
PE	Ground connection
L1, L2/N	AC connection for single-phase equipment
L1, L2, L3	AC connection for three-phase equipment
DC+	DC bus
RBI	Internal ballast
RBE	External ballast
DC-	DC bus
U, V, W	Motor connections

Continued on next page

Components, continued

Drive control Lexium05 LXM05AD10M2	Overview of signal connections 

Connections/ Switches	**Meaning**
CN1	Analog inputs +/-10 V, pins 11 to 14
	CANopen, pins 21 to 23
	Digital inputs/outputs, pins 31 to 39
CN2	Motor encoder (Hiperface sensor)
CN3	24V power supply
CN4	PC, remote operating terminal, MODBUS, CANopen; (RJ45)
CN5	ESIM A/B/I out, PULS/DIR in, encoder A/B/I in
S1	Switch for CANopen terminating resistor

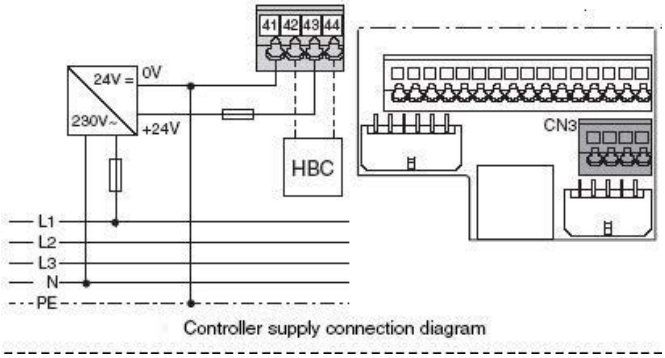
Drive control Lexium05 LXM05AD10M2	Motor encoder  Figure 6.18 Motor sensor connection diagram

Pin	**Signal**	**Motor, Pin**	**Color** [1)]	**Pair**	**Meaning**	**I/O**
1	Shield filler wires				Shield filler wires	
12	SIN	8	white	1	Sine signal	E
6	REFSIN	4	brown	1	Reference for sine signal, 2.5 V	A
11	COS	9	Green	2	Cosine signal	E
5	REFCOS	5	yellow	2	Reference for cosine signal, 2.5 V	A
8	Data	6	gray	3	Receive data, send data	I/O
2	$\overline{\text{Data}}$	7	pink	3	Receive data, send data, inverted	I/O
10	ENC_0V	11	blue	4	Reference voltage encoder (0.5 mm^2)	A
			red	4	Not assigned (0.5 mm^2)	
3	TMOT_0V	1	black	5	Reference potential for T_MOT	-
			violet	5	Not assigned	
9	T_MOT	2	gray/pink	6	PTC temperature sensor	E
4	ENC+10V_OUT	10	red/blue	6	10 V DC supply for encoder, max. 150 mA	A
7	n.c.				Not assigned	

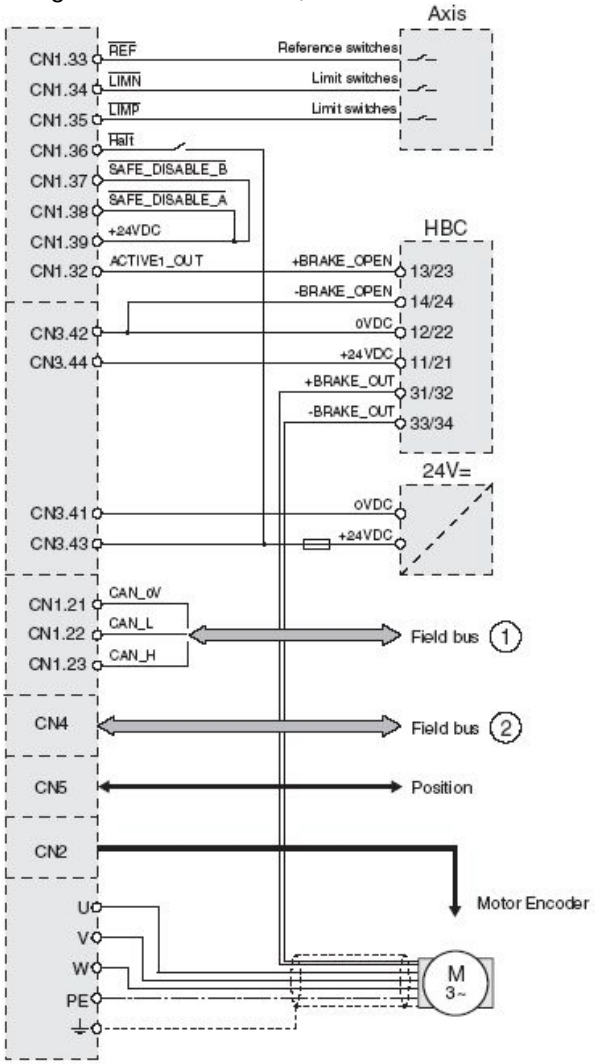
1) Colors quoted refer to the supplied cable.

Continued on next page

Components, continued

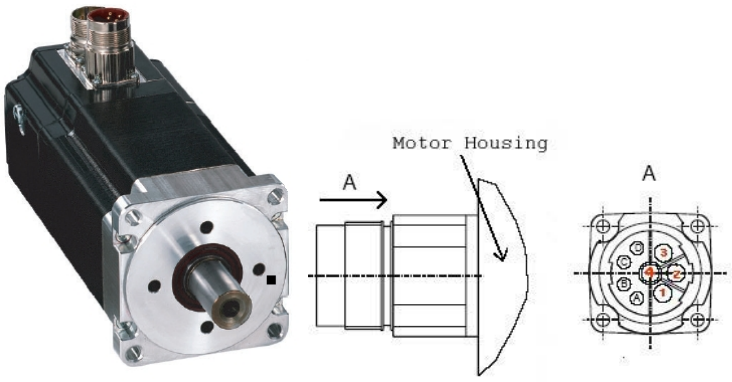
Drive control Lexium05 LXM05AD10M2 HBC Holding brake control	24V power supply  Controller supply connection diagram

Pin	Signal	Meaning
41	0 VDC	Reference voltage for 24 V supply
42	0 VDC	Reference voltage for 24 V supply
43	+24 VDC	24V supply voltage
44	+24 VDC	24V supply voltage

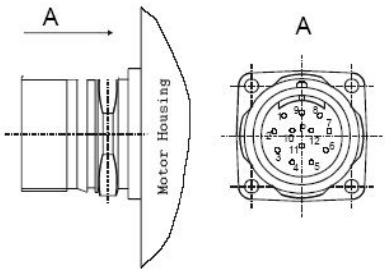
Drive control Lexium05 LXM05AD10M2 Terminals 33-39 must be connected. The motor brake (if present) must be connected via a holding brake control (HBC) We use the RJ45 terminal for CANopen.	Wiring for field bus control, **NO secure hold** 

Continued on next page

Components, continued

AC synchro servomotors SER3683L5SSO AOO **Power cable GEA2M0AAAA003**	

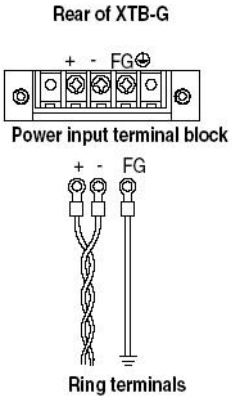
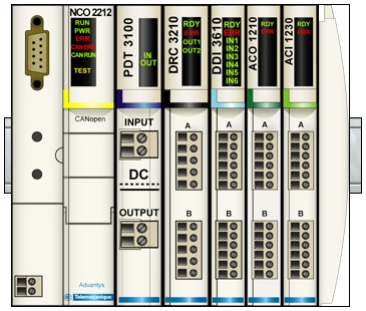
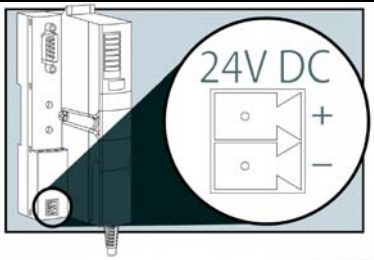
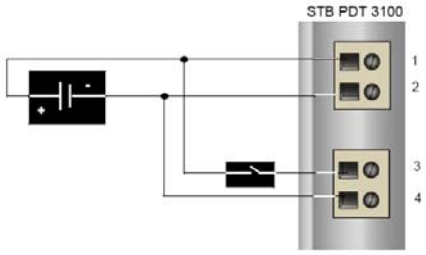
Pin	Meaning
1	U
2	PE
3	W
4	V
A	Brake (not assigned)
B	Brake (not assigned)
C	Not assigned
D	Not assigned

Feedback cable GEA2EAAAAA003	

Pin	Meaning
1	PTC/NTC temperature sensor
2	PTC/NTC temperature sensor
3	Not assigned
4	REF SIN
5	REF COS
6	RS 485 positive data
7	RS 485 negative data
8	+ SIN
9	+ COS
10	U_s 7-12 V
11	GND
12	Not assigned

Continued on next page

Components, continued

HMI Magelis XBT-G2330		
Advantys STB		
Advantys STB Power supply	  1 +24 VDC sensor bus power 2 –24 VDC return line of sensor power supply 3 +24 VDC actuator bus power 4 –24 VDC return line of actuator power supply	

Software

General

The software for the Twido PLC, the Magelis graphic touch panel and the Advantys configuration needs to be installed.

There is an input panel (HMI) with display and keys on the front of the drive control for ease of parameterization. You will need to install the PowerSuite software in order to maximize user-friendliness for parameterization, saving and simulation of the drive control.

The PC needs to have a Microsoft Windows® operating system installed, either Windows® 2000 or Windows® XP.

Communication

General

The methods of communication below are used between devices:

- CANopen
- Modbus

CANopen is used for communication at field bus level between the Twido PLC, the Lexium 05 drive controls and the remote Advantys I/O platform.

Modbus is inserted between the Magelis graphic touch panel (HMI) and the Twido PLC.

Twido PLC

1 TWD LMDA 40DTK

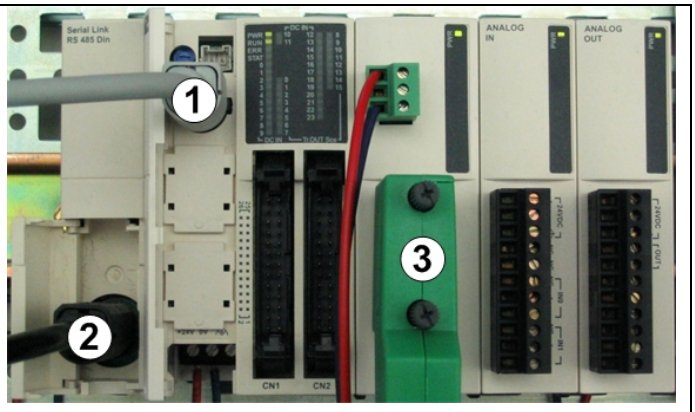
The TSX PCX 1031 cable is used for the connection between the serial interface of the PC with TwidoSoft and the PLC.

2 RS485 extension TWD NOZ 485D

The XBT Z968 cable is used to connect the HMI and the PLC.

3 CANopen extension TWD NC01M

The standard CANopen plugs and cables are used.



Drive control Lexium05

LXM05AD10M2

CANopen via CN4 (RJ45)

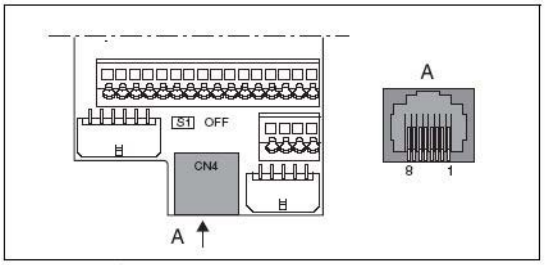


Figure 6.29 CANopen connection diagram at CN4

Pin	Signal	Meaning
1	CAN_H	Data line
2	CAN_L	Data line, inverted
7	MOD+10V_OUT	10 V supply (different assignment from CANopen)
8	MOD_0V	Reference potential for MOD+10V_OUT

Magelis XBT-G2330 HMI

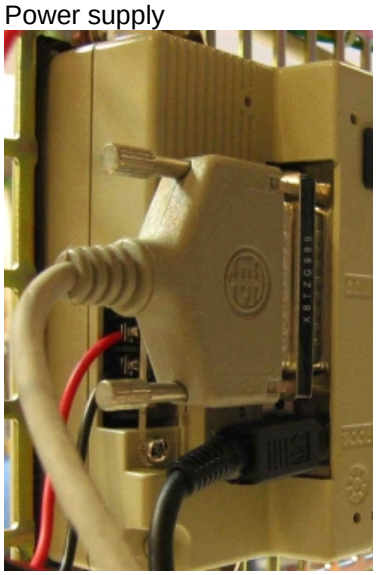
XBTZ968
XBTZG999

Communication cables for PLC including adapter.

XBTZG915

Serial communication cable to PC (with Vijeo Designer). The Ethernet interface can be used as an alternative.

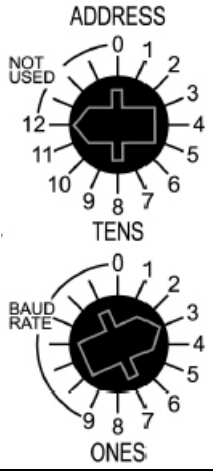
Power supply

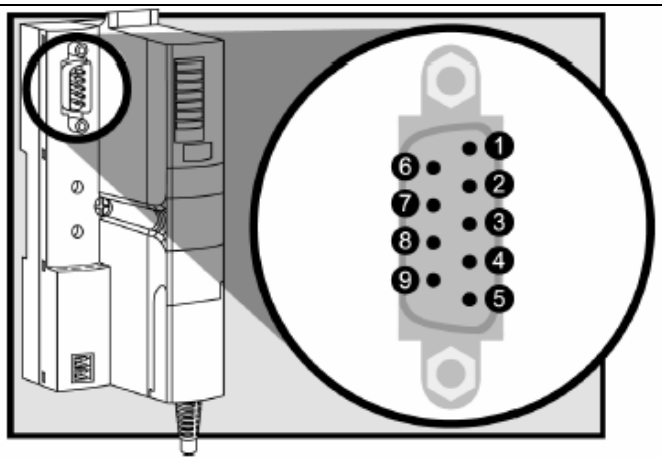


Advantys STB

CANopen connector

Use the following switches to set the baud rate (500 kbaud) and address (8).





Pin	Signal	Meaning
1	Not used	Reserved
2	CAN_L	CAN bus line, Low
3	CAN_GND	CAN ground
4	Not used	Reserved
5	CAN_SHLD	Optional CAN shield
6	GND	Optional ground
7	CAN_H	CAN bus line, High
8	Not used	Reserved
9	Not used	Reserved

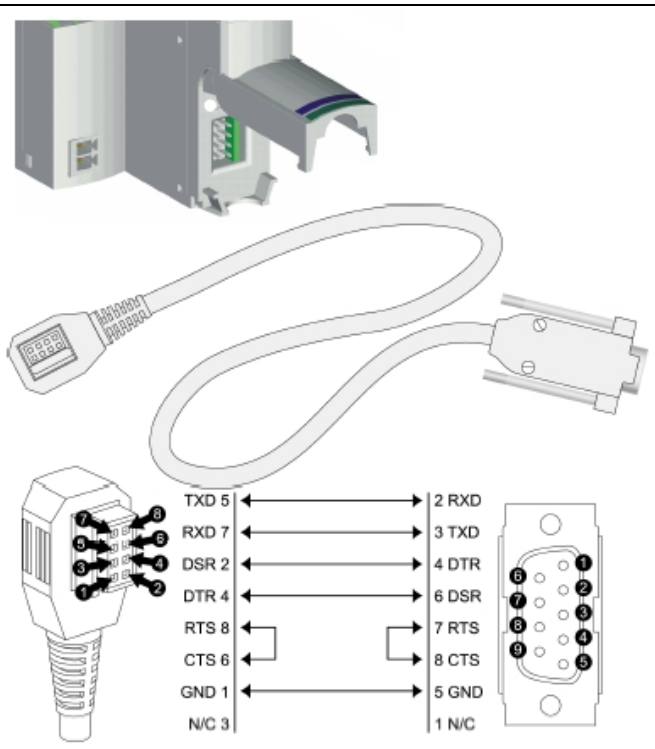
Note: The pin numbers are shown in the figure above.

Continued on next page

Advantys STB, continued

Programming cable STB XCA 4002

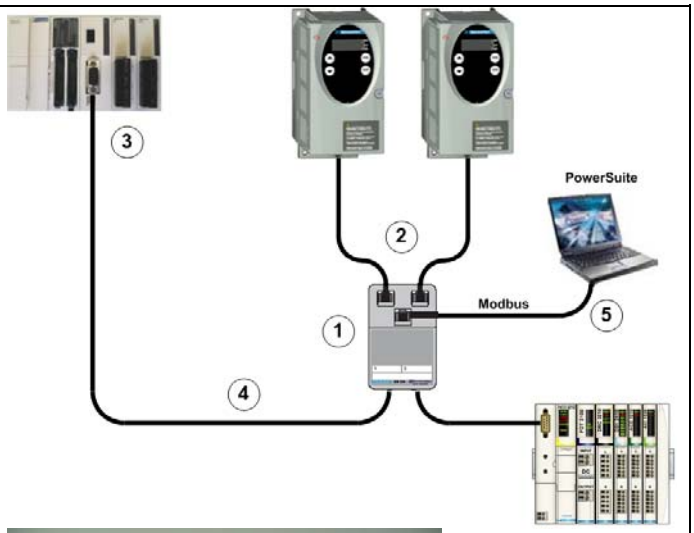
For connection to the serial interface of a PC with Advantys software.

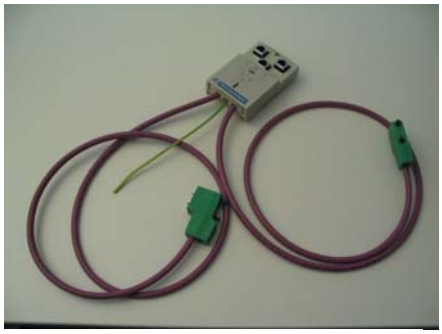


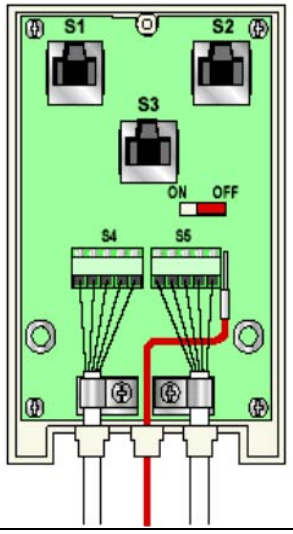
TXD transmit data
RXD receive data
DSR data set ready
DTR data terminal ready
RTS request to send
CTS clear to send
GND ground reference
N/C not connected

CANopen

1	**CANopen Adapter VW3 CAN TAP2**
2	**CANopen ATV31 VW3 CAN CA RR● branching cable** available in various lengths
3	**PLC with CANopen Master TWD NCO1M**
4	**Main cable**
5	**VW3 A8106 PowerSuite cable** Connection between PC with PowerSuite software and a Lexium05.





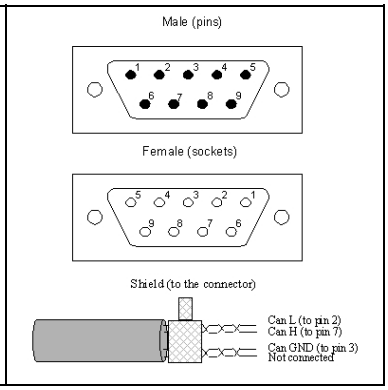


Switch set to OFF

Pin	Signal	Meaning
1	GND	Optional ground
2	CAN_L	CAN bus line, Low
3	SHLD	Optional shielding
4	CAN_H	CAN bus line, High
5	(V+)	Optional supply (1)

Continued on next page

CANopen, continued

Plug 103643 (including terminating resistor for connection to TSXCPP110 Tap and Advantys) **Cable** DCA 701 (44170014 by Selectron) or UNITRONIC BUS CAN 2170261 (by LAPP)		

Pin	Signal	Meaning
2	CAN_L	CAN bus line, Low
3	CAN_GND	CAN ground
7	CAN_H	CAN bus line, High

Implementation

Introduction

This chapter describes how to initialize, parameterize, program, and start up the system.

Function

Functional description

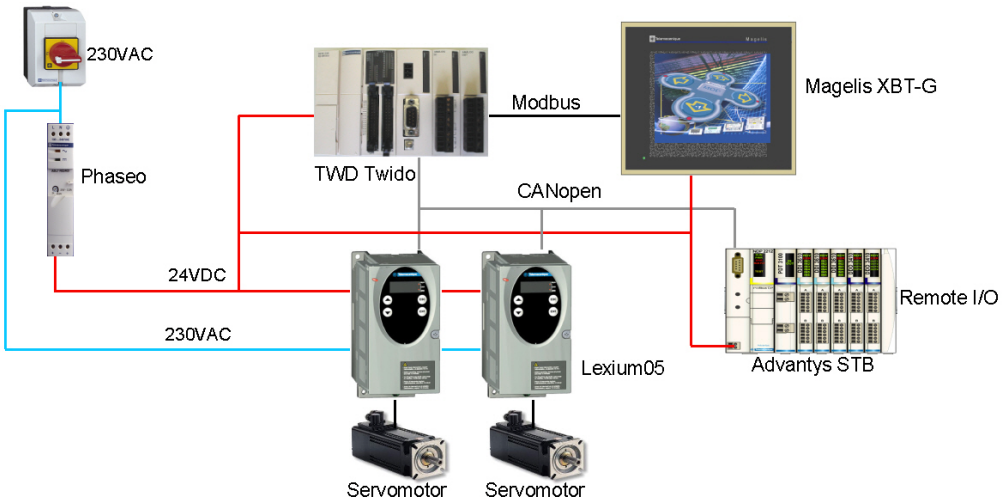
1. After the power is switched on, all devices run through the initialization stage and the PLC starts communication. Pressing the “Power up” button on the Magelis touch panel for two seconds then puts the Lexium05 drive controls into “run” status. It changes automatically to “speed mode” at this point.

2. After power up, the controller is in manual mode. This gives the user access to the status machine of the two drive controls, which can both be started and stopped manually. Their speed and direction can also be set.

3. The drive controls must be stopped to change to automatic mode.
   The “Auto” button selects automatic mode and starts speed regulation. The speed increases from 0 to 600 rpm within one minute. This is maintained for 10 seconds and then changes to -600 rpm in two minutes. After another 10 seconds at the same speed, the motor is brought down to 0 rpm within one minute. After a waiting time of 10 seconds the ramp starts again.

4. If an error occurs, the error number is displayed on the touch panel. The user can look up the description of the error in the operating manual.

Layout



Order of tasks

Proceed as follows to optimize the setup time of the individual products:

1. Set the initial parameters of the drive control via the integral operating panel
2. Set up the I/O platform using Advantys Config tool
3. Set up the user program by means of TwidoSoft
4. Set up display (HMI) using Vijeo Designer

Proceeding in the sequence described above will ensure that the relevant information can either be imported directly or entered manually from the previous action.

Lexium05 drive control

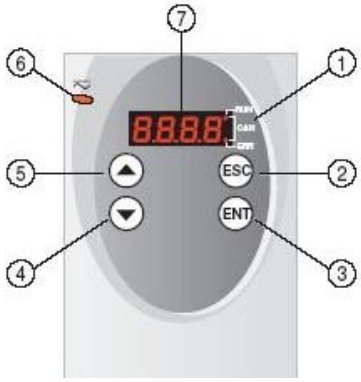
Introduction

This section describes the basic settings that have to be made on the Lexium05 drive controls.

In particular, these include the communication parameters such as:

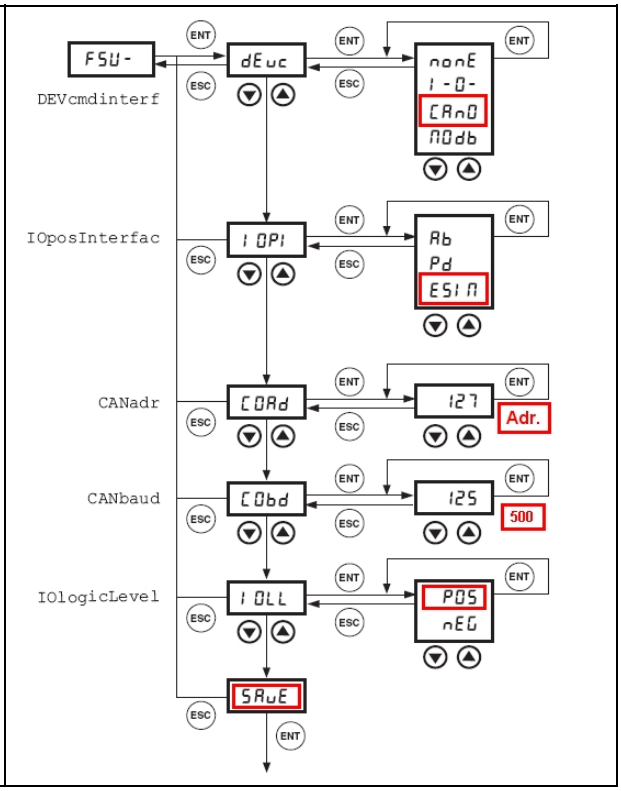
- Field bus type — CANopen
- Address — 5 or 6 in this instance
- Transfer speed — 500 kbaud

Basic settings

1	After wiring is complete the drive control parameters must be set.	
2	Parameters can be edited via the integral operating panel (HMI).	 1 LEDs for CANopen 2 ESC - Exit from a menu or a parameter - Return to the last saved value 3 ENT - Call up a menu or a parameter - Save the displayed value 4 Down arrow - Change to the next menu or parameter - Decrease the displayed value 5 Up arrow - Change to the previous menu or parameter - Increase the displayed value 6 Red LED lit (DC bus live) 7 7-segment 4-character display

Continued on next page

Basic settings
continued

3	When the drive is supplied with 24V for the first time, or if the factory settings have previously been loaded with the `PARfactorySet` parameter, all the drive functions are still blocked. **You must carry out an initial setup procedure.** This example uses the address (Adr.) 5 or 6 and the transfer speed 500 kbaud. On completion the drive should report “RDY” (ready) in the status display.	

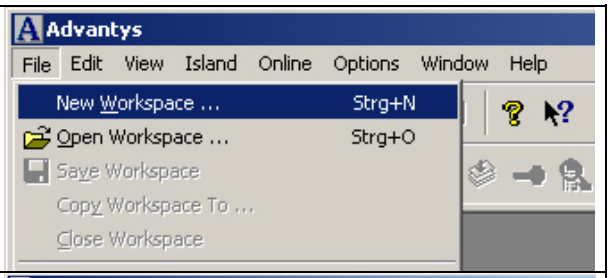
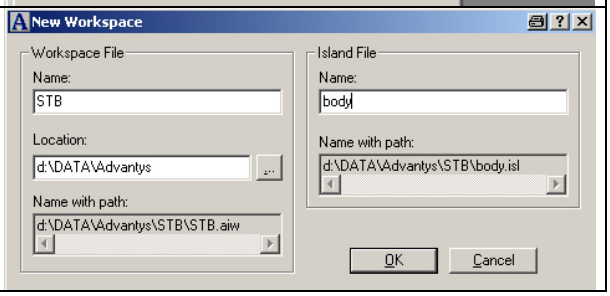
I/O platform

Introduction

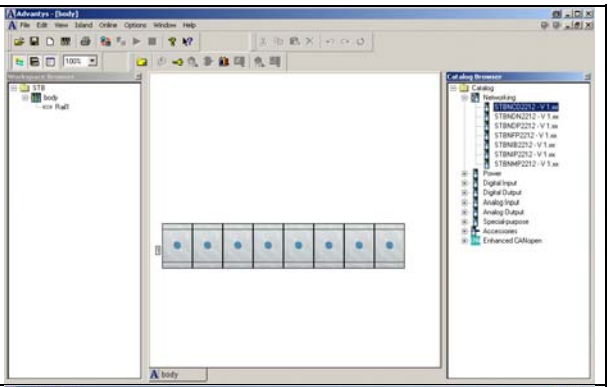
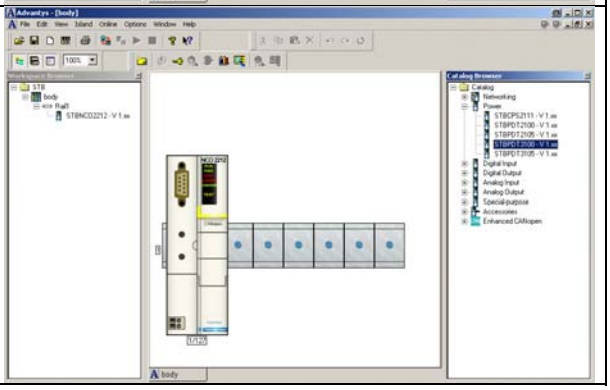
This section describes how the Advantys I/O platform is configured. The Advantys configuration software is used for this purpose.

We suggest that you proceed as follows:
- Create a new project (workspace)
- Configure the hardware (network interface, power supply and I/O modules)
- Configure CANopen communication
- Create the EDS file

Create a new project

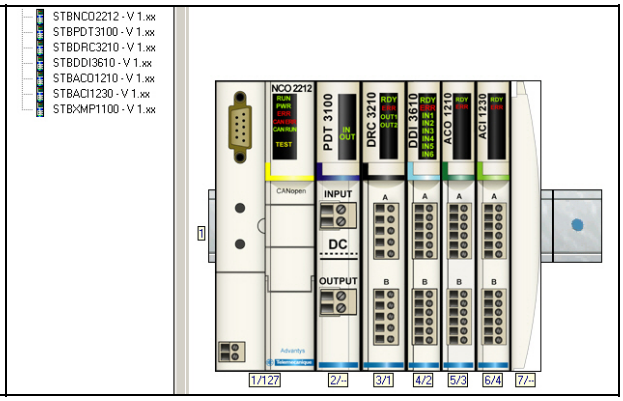
1	After starting the Advantys configuration software, you must create a new workspace.	
2	To do this, specify the path, the workspace name and the name of the first island.	

Configuring the hardware

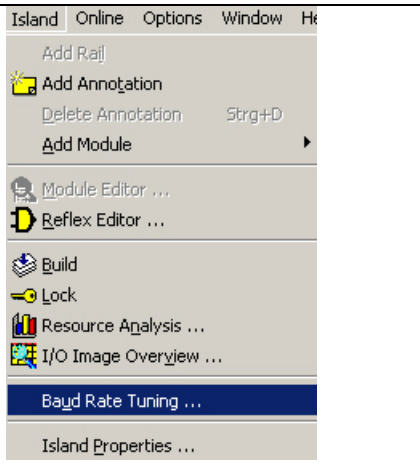
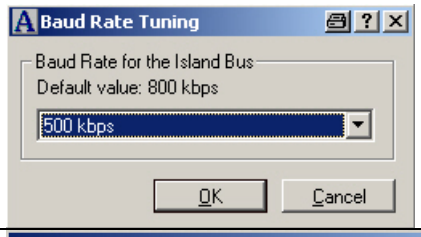
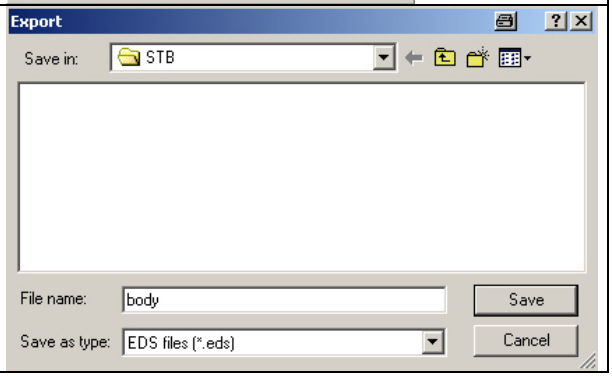
1	Select the network interface for CANopen: • STB NCO 2212	
2	Next, add the other stations: • STB PDT 3100 • STB DRC 3210 • STB DDI3610 • STB ACO 1210 • STB ACI 1230	
3	Remember the bus connection! • STB XMP 1100	

Continued on next page

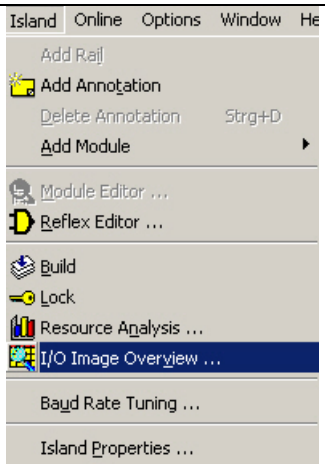
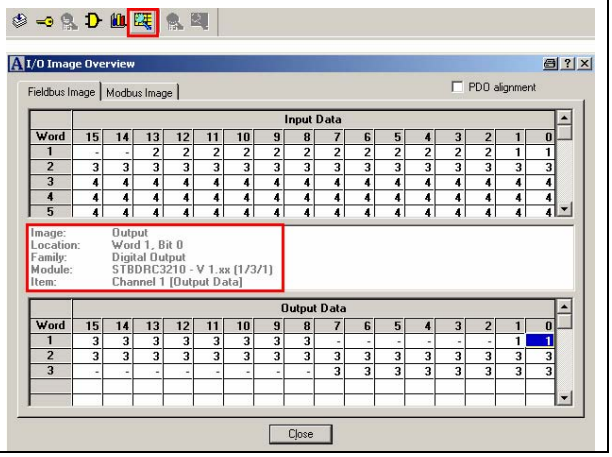
Configuring the hardware, continued

4	The display should look like this.	

Configuring CANopen communication

1	The internal baud rate can be set via the menu bar. The rate used is 500 kbps. Set the parameter for the transfer rate between NIM and PLC with the two rotary switches on the front of the NIM.	 
2	Finally, the EDS file needs to be created by selecting “Export” from the “File” menu. The name and location are freely selectable. This file is required for subsequent processing operations.	

Assign I/Os

1	You can use the “I/O Image Overview…” menu item or the  icon to call the function for assigning I/Os to memory areas. The information concerning the selected data is displayed in the description field. Alternatively, the project can also be printed out. The printout will contain the same information.	 

PLC

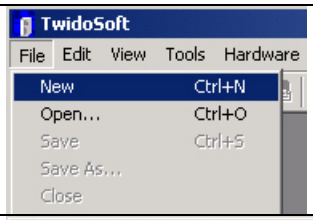
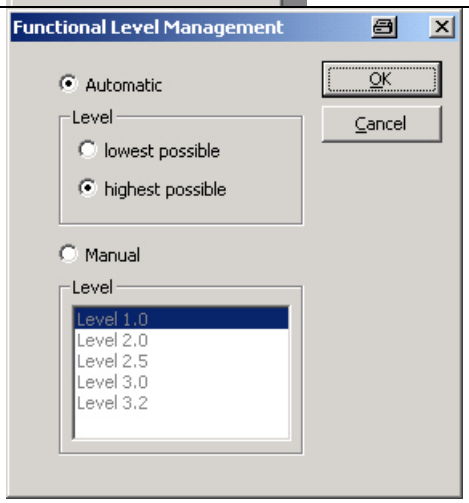
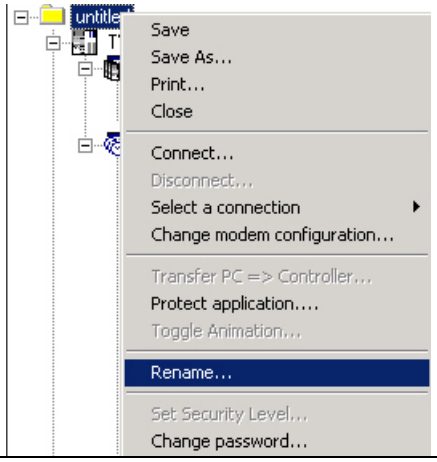
Introduction

The PLC section describes the various steps for setting up the PLC logic. TwidoSoft is used.

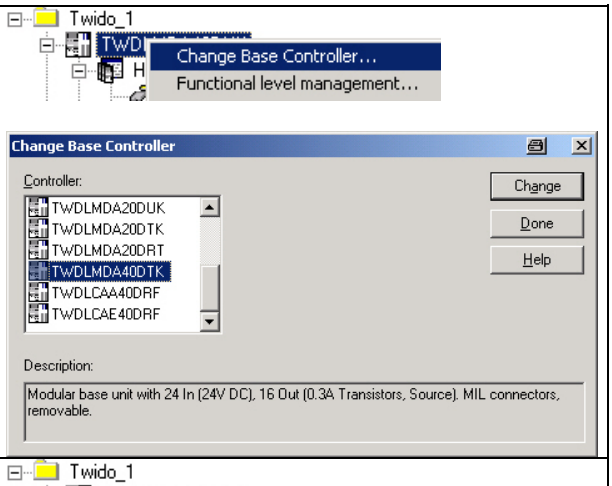
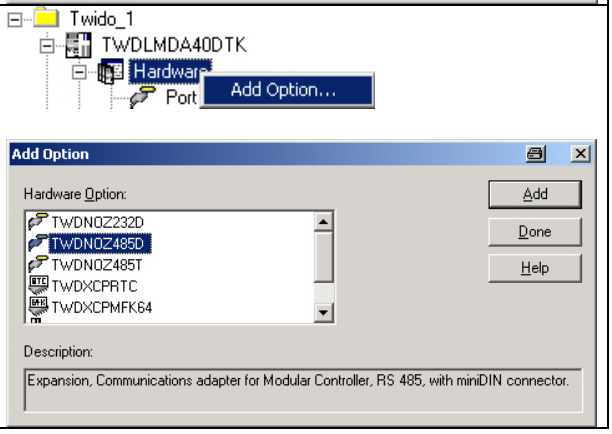
Proceed as follows to integrate the PLC:

- Create a new project
- Configure the hardware (central unit + modules)
- Configure Modbus communication
- Configure CANopen communication
- Set up the user program
- Connect the PLC to the PC
- Transfer the user program to the PLC

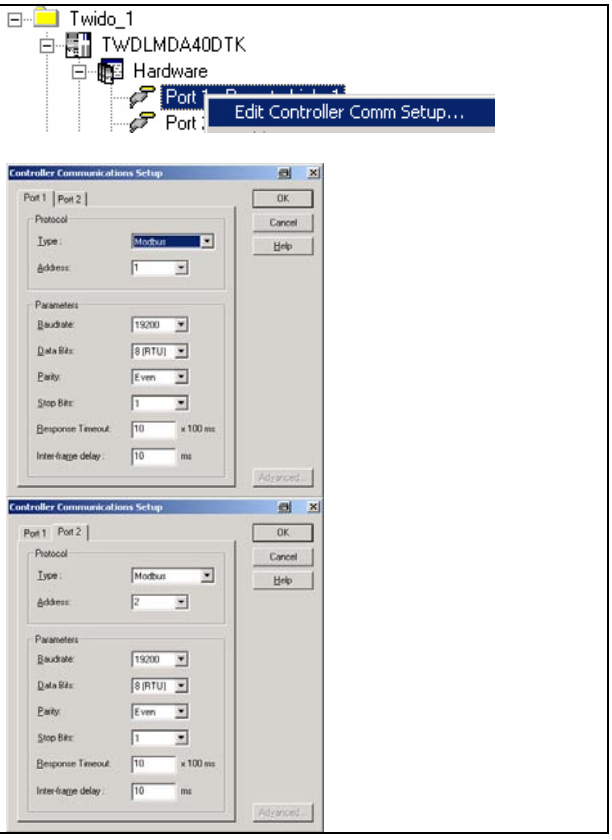
Create a new project

1	After starting the software, the first thing you need to do is create a new project.	
2	Select the functional level and then enter an application name.	 

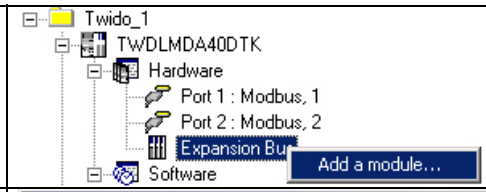
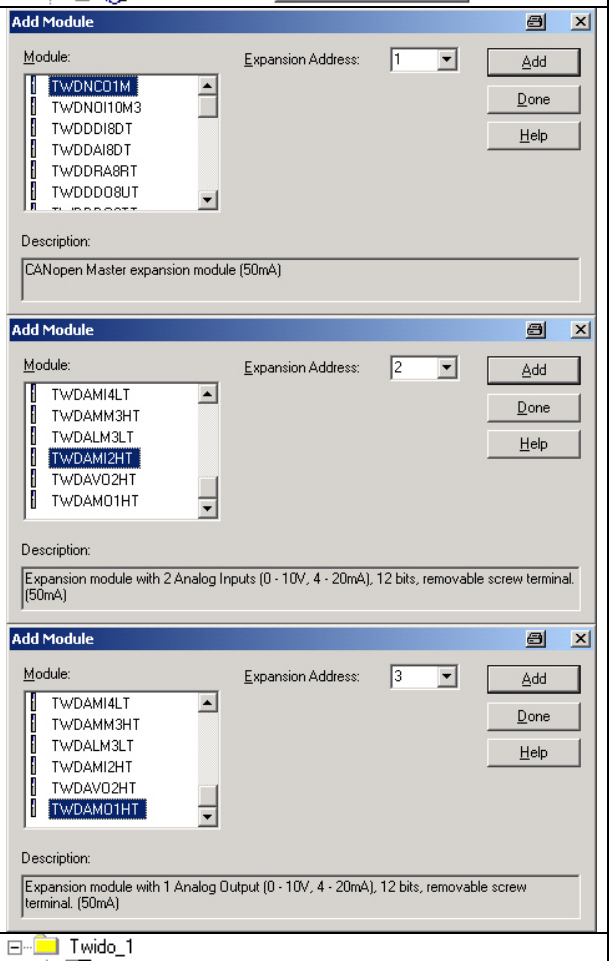
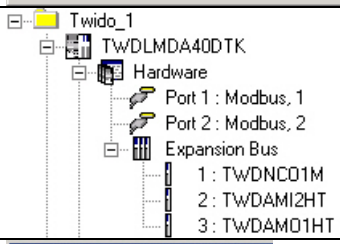
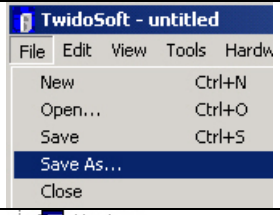
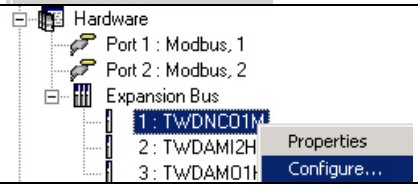
Configure the hardware

1	If the power base that is offered is not the one used you must change it. Select the PLC power base	
2	Then add the additional RS485 interface.	

Configure Modbus communication

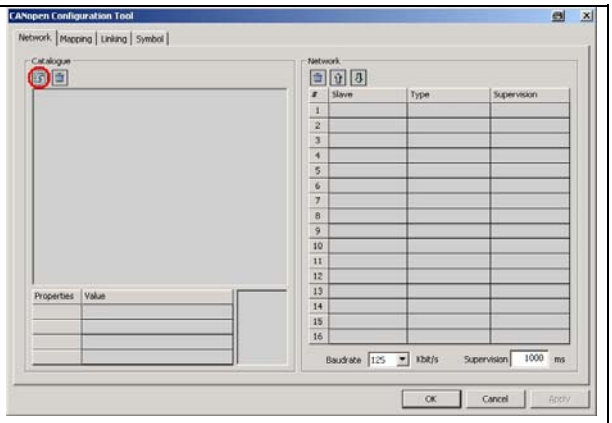
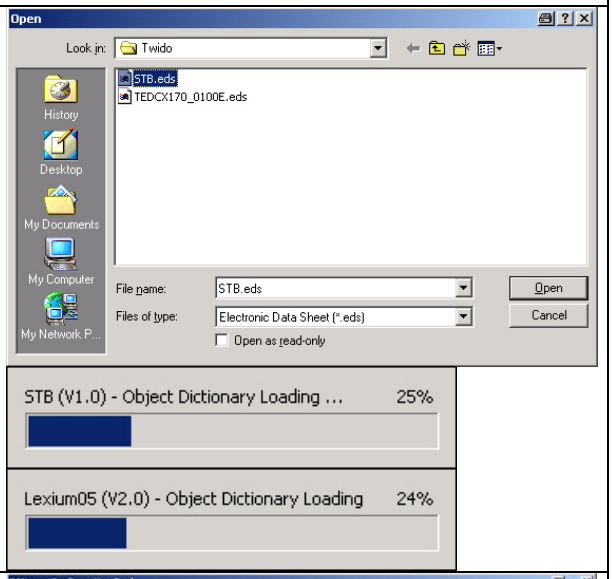
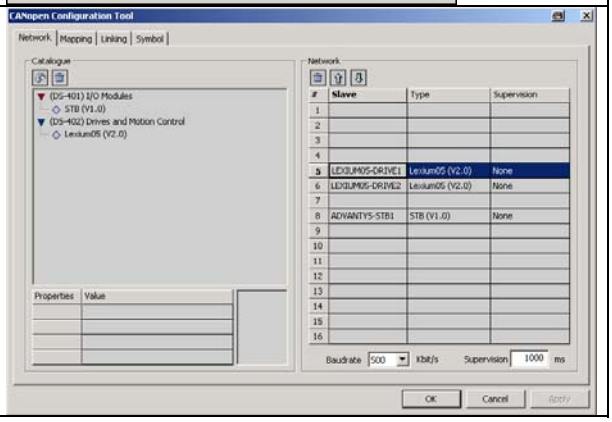
1	The appropriate interface parameters need to be entered. Communication type: **Modbus** Address: **1 for PC (Port 1)** **2 for HMI (Port 2)** Baud rate: **19200 baud** The settings for Port 2 must be the same as those for the HMI.	

Configure CANopen communication

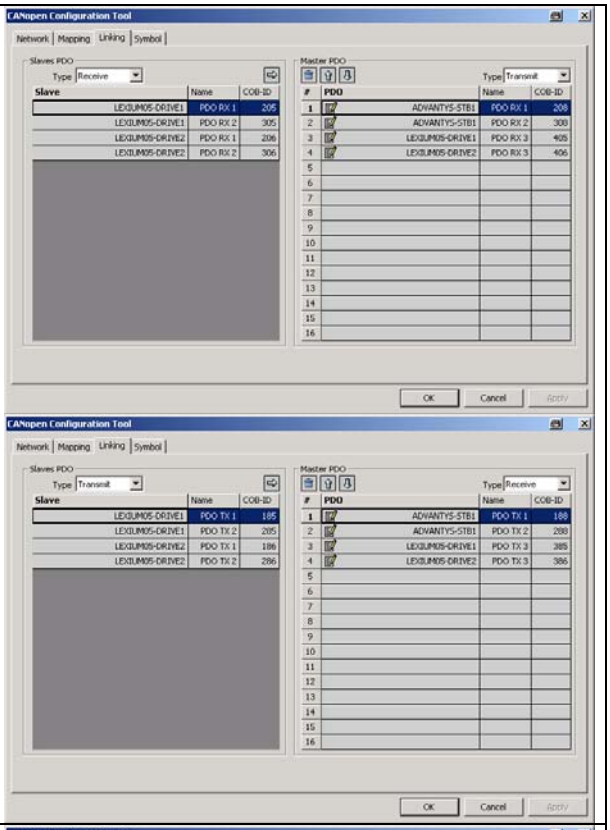
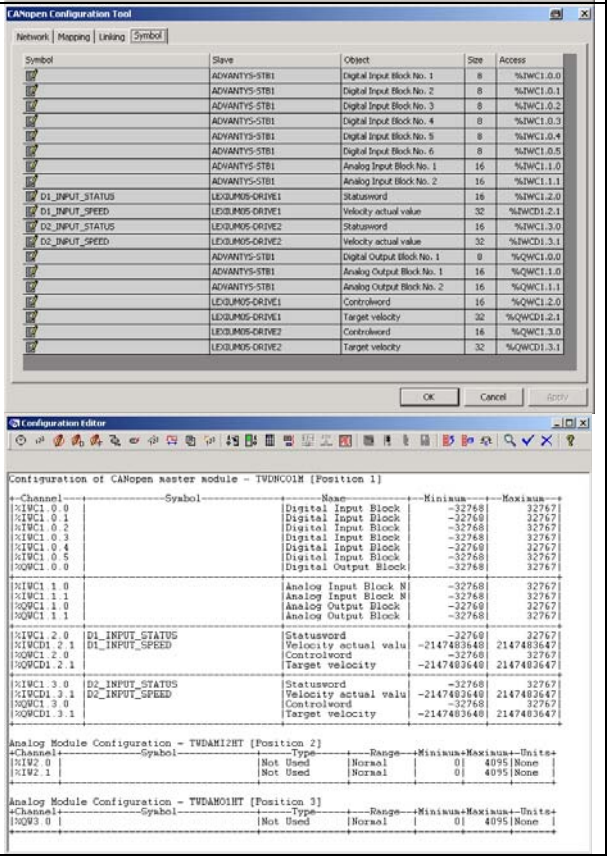
1	Add the modules for the extension.	
2	First the CANopen master and, in our example, analog input and output modules (one of each).	
3	The following should then be displayed in the application navigator.	
4	The project can be saved at any time with “Save As…” and later with “Save”.	
5	The configuration tool must be opened to configure the CANopen Master.	

Continued on next page

Configure CANopen communication, continued

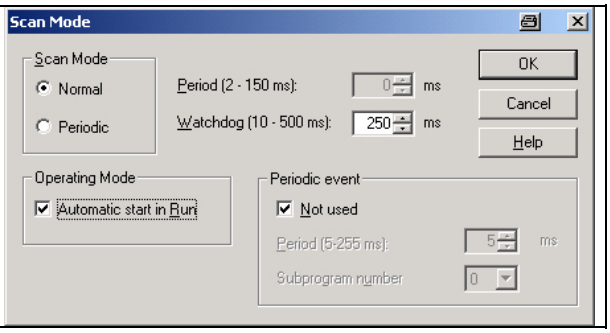
6	First the EDS files must be imported. Click on the “import/update” button in the window.	
7	Next select, firstly the EDS file created by the Advantys software. Then select the EDS file that belongs to the drive control.	
8	Use the “Add” button to move both of the drive controls and the Advantys into the program block. Then position them at the correct address using the “higher/lower” buttons. After this, select a baud rate of 500 kbit/s and change the name of the slave as desired. This is the result.	

Continued on next page

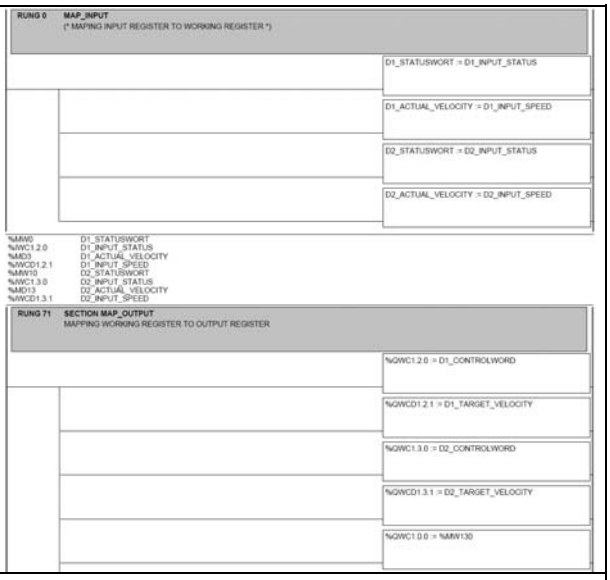
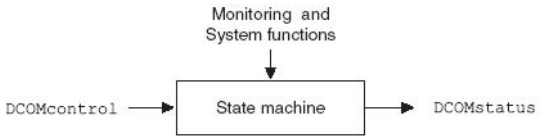
Configure CANopen communication, continued	**9**	The “Mapping” tab holds information on the contents of the individual PDOs. No changes are needed here. To send and receive, the two Advantys PDOs and the PDO 3 for each Lexium must be added to the “Linking” tab. This produces the following image. The same applies to communication in the other direction.	
	10	The “Symbol” tab contains the address assignment. The configuration editor window also shows this information.	

Continued on next page

Configure CANopen communication, continued

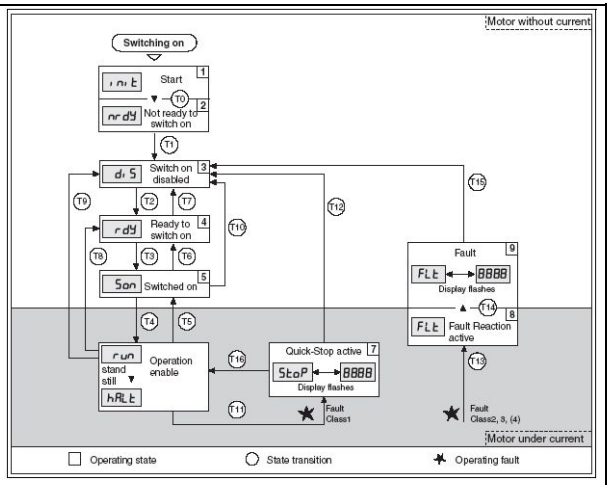
11	Autostart is one of the features that can be activated using the menu bar under “Program -> process Scan Mode”.	

Creating the application program

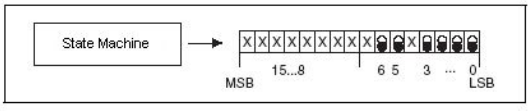
1	Now create the application program. This is an example of an approach to a solution. These are copied into a working area for flexible use of the I/Os.	
2	The Lexium05 shows the relationships between the operating states and state transitions in the state machine. The operating states are influenced by the user with the control word **(`controlword`)** and monitored with the status word (**`statusword`**).	

Continued on next page

Creating the application program, continued

3	The Lexium05 displays the operating states numbered **1** to **9** in rectangles and the transitions numbered 0 to 16 in circles.	
4	When it is switched on the Lexium05 is in state 4 (rdy) and when the drive is running it is in state 6 (run). Description of operating states:	

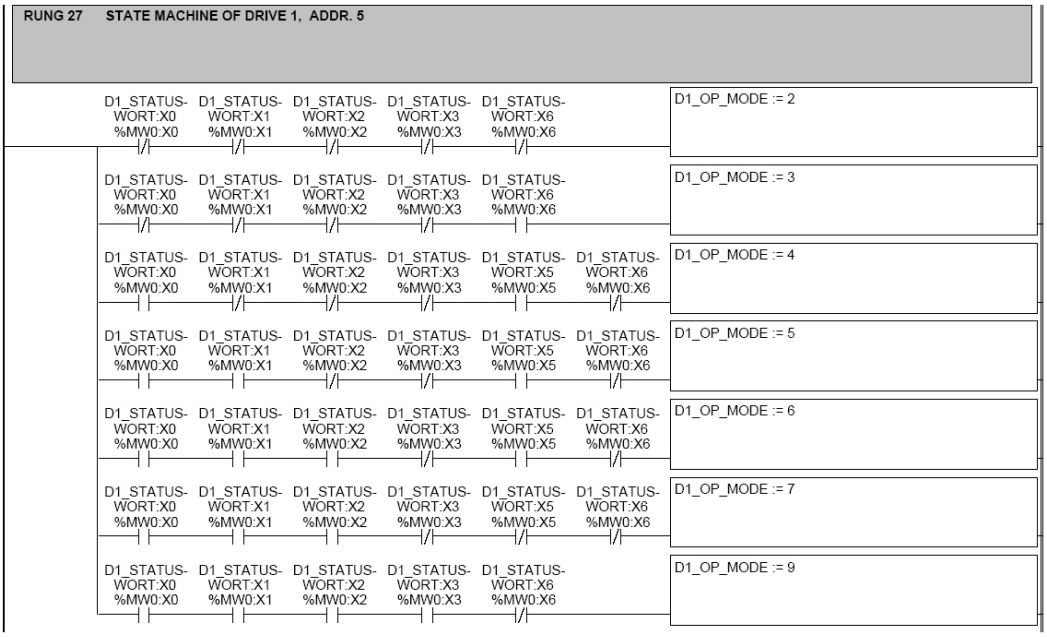
State	Operating state	Action by the state machine
1	Start	24 V is switched on Device electronics are initialized. End stage is not ready to be switched on.
2	Not ready to switch on	
3	Switch on disabled	Switching on the end state is disabled.
4	Ready to switch on	End stage is ready to be switched on.
5	Switched on	End stage is switched on and motor phases, grounding and zero clamp are tested. The brake is opened (after transition 4 -> 5) or closed (after transition 6 -> 5). No operating mode is active.
6	Operation enable	The device runs in the operating mode that has been set.
7	Quick Stop active	A quick stop is executed.
8	Fault Reaction active	When a fault is detected the fault reaction is activated if this is possible
9	Fault	

5	When standardized operating modes are in use, the operating states are monitored via bits 0 to 3, 5 and 6 and the status word. The status word is read in via the CANopen bus and the operating state is written in %MW200 (%MW201 for the second Lexium05).	

Status	Bit 6 Switch On disable	Bit 5 Quick Stop	Bit 3 Fault	Bit 2 Operation ENABLE	Bit 1 Switch On	Bit 0 Ready to Switch On
2: Not ready to switch on	0	X	0	0	0	0
3: Switch on disabled	1	X	0	0	0	0
4: Ready to switch on	0	1	0	0	0	1
5: Switched on	0	1	0	0	1	1
6: Operation enable	0	1	0	1	1	1
7: Quick Stop active	0	0	0	1	1	1
9: Fault	0	X	1	1	1	1

Continued on next page

Creating the application program, continued



6 State transitions are triggered by a command or in reaction to a monitoring signal. A command is given to the Lexium05 via the **`controlword.`**
State transitions 0, 1 and 14 occur automatically in the device and are not command-activated. The following table shows state transitions that can be triggered by commands.

Transition	Operating state	Condition / Event [1]	Response
T0	1 -> 2	• Motor speed below switch-on limit • Unit electronics successfully initialised	Check motor encoder
T1	2 -> 3	• First commissioning is completed	-
T2	3 -> 4	• Motor encoder check successful, DC-BUS voltage active, SAFE_DISABLE = +24V, field bus command Shutdown [2]	-
T3	4 -> 5	• Field bus command Switch On • Input signal ENABLE 0 -> 1	
T4	5 -> 6	• Field bus command Enable operation	Switch on output stage. Motor phases, earthing, User parameters are checked Brake released
T5	6 -> 5	• Field bus command Disable Operation • Input signal ENABLE 1 -> 0	Interrupt task with "Halt" Brake actuated Switch off output stage
T6	5 -> 4	• Field bus command Shutdown	
T7	4 -> 3	• DC-BUS low voltage • SAFE_DISABLE = 0V • Field bus command Disable Voltage	-
T8	6 -> 4	• Field bus command Shutdown	Switch off output stage immediately, no "Quick Stop"
T9	6 -> 3	• Field bus command Disable Voltage	Switch off output stage immediately, no "Quick Stop"
T10	5 -> 3	• Field bus command Disable Voltage	Switch off output stage immediately, no "Quick Stop"
T11	6 -> 7	• Class 1 error • Field bus command Quick Stop	Interrupt task with "Quick Stop"
T12	7 -> 3	• Field bus command Disable Voltage	Switch off output stage immediately, even if "Quick Stop" still active
T13	x -> 8	• Errors Class 2, 3 or 4	Error response is carried out, see "error reaction
T14	8 -> 9	• Error response completed • Errors Class , 3 or 4	Unit changes to Fault state
T15	9 -> 3	• Field bus command Fault Reset • Input signal FAULT_RESET 0 -> 1	Fault is reset
T16	7 -> 6	• Field bus command Fault Reset + Enable Operation • Input signal FAULT_RESET 0 -> 1	Continue with task from state set in "Quick Stop"

7 The operating states are set via the control word. Bits 0 to 3 and bit 7 are relevant to state transitions.

The bit states in the fields marked “X” are not relevant to the state change concerned.

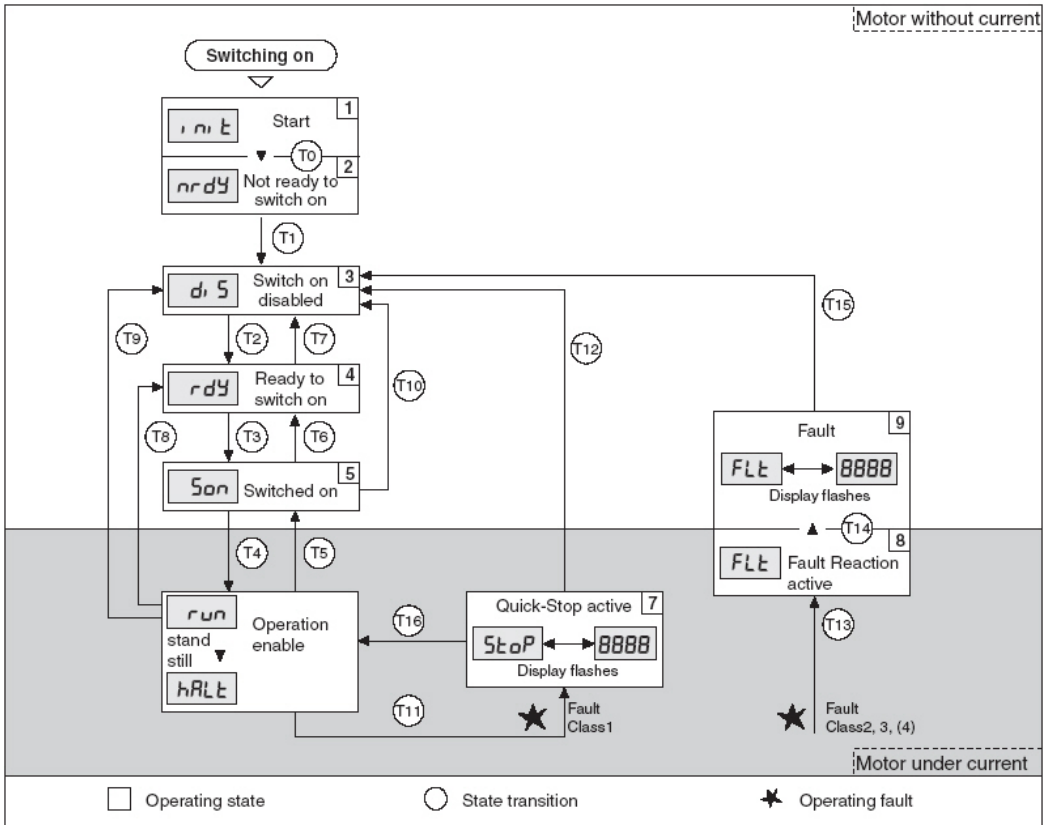
Field bus command	state transitions	Status change open	Bit 7, Reset Fault	Bit 3, Enable operation	Bit 2, Quick-Stop	Bit 1, Disable Voltage	Bit 0, Switch On
Shutdown	T2, T6, T8	4: Ready to switch on	X	X	1	1	0
Switch On	T3	5: Switched on	X	X	1	1	1
Disable Voltage	T7, T9, T10, T12	3: Switch on disabled	X	X	X	0	X
Quick Stop	T7, T10T11	3: Switch on disabled7: Quick Stop active	X	X	0	1	X
Disable Operation	T5	5: Switched on	X	0	1	1	1
Enable operation	T4, T16	6: Operation enable	X	1	1	1	1
Fault Reset	T15	3: Switch on disabled	0->1	X	X	X	X

Continued on next page

Creating the application program, continued

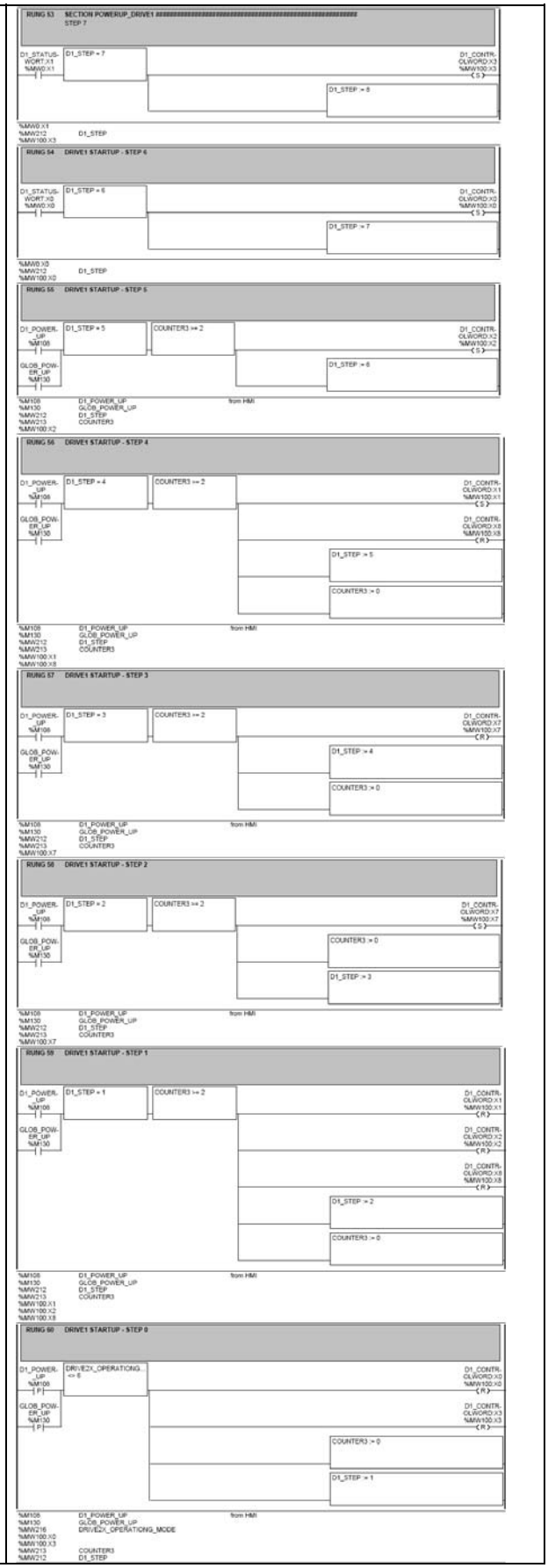
8	After power restoration the Lexium05s are designed to return automatically to operating state 4 **(rdy)** “Ready to switch on”. This can also be tracked on the Lexium05 display.

Display	Operating state
Init	Initialization of device electronics (INITialize)
nrdy	End stage is not ready to switch on (Not ReaDY)
diS	Switching on the end state is disabled (switch on DISabled)
rdy	End stage is ready to switch on (ReaDY)
Son	End stage is switched on (Switch ON)
run	The device runs in the operating mode that has been set (RUN)
StoP	A quick stop is executed (STOP)
FLt	Fault detected and fault reaction activated (FauLT)
8888	Displays flashing number alternating with FLt or StOP



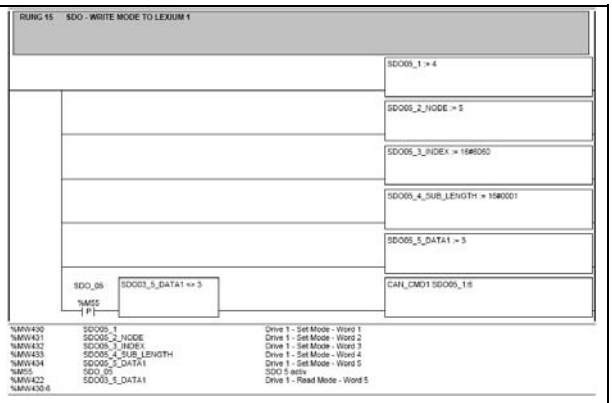
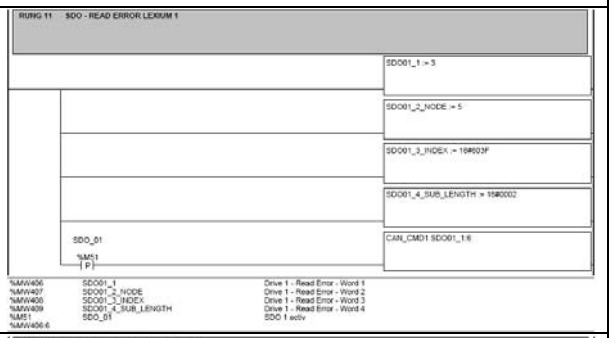
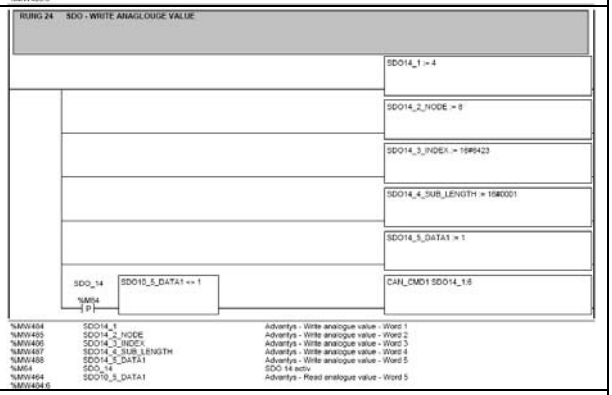
Continued on next page

Creating the application program, continued

9	To change the drive to operating state 6 (**run**) “Operation enable”, activate the PLC logic by pressing the “Power up” button on the Magelis HMI. This causes the state machine to run in sequence.	

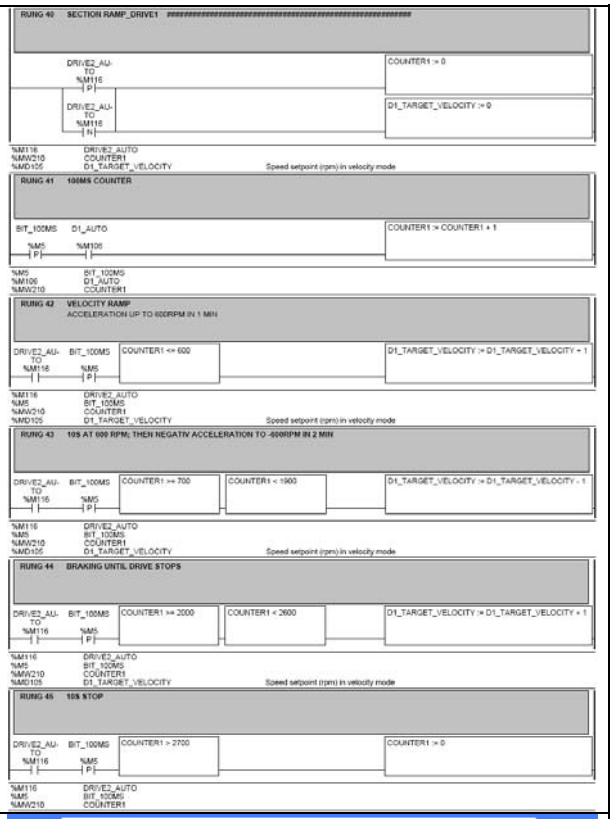
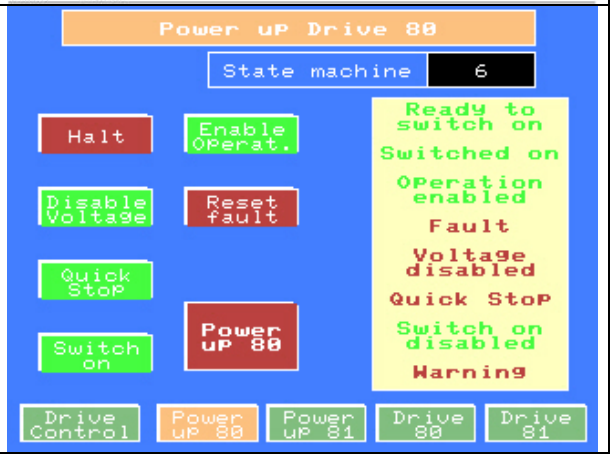
Continued on next page

Creating the application program, continued

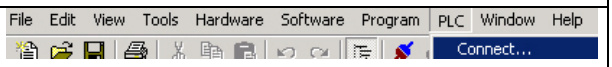
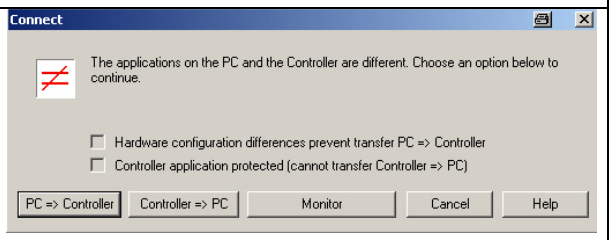
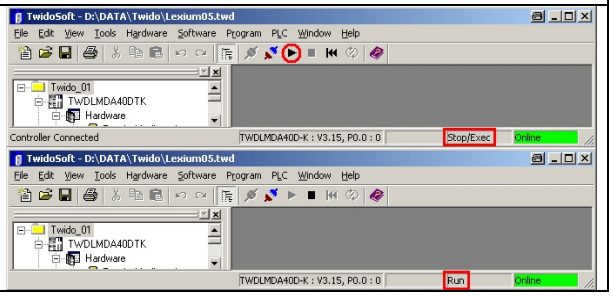
10	In this application the “speed profile” mode is used (see also PDO 3). Since the Lexium05 may be in a different operating mode, e.g. after power restoration, you must make sure that the speed profile is activated. The end stage must be switched on (operating state 6, “Operation enabled) in order to change the mode. If it is, the instruction CAN_CMD can be used to write “03” (= speed profile) to the mode register 6060:0_{hex} of the Lexium. The CAN_CMD instruction sends an SDO. Please consult the description of the Lexium for other operating modes.	
11	The fault register 603F:0_{hex} of the Lexium05 is read out at regular intervals. The **CAN_CMD** instruction is also used for this purpose.	
12	After the Advantys is switched on the data exchange from analog inputs as per CANopen guideline is deactivated. It has to be enabled via the Advantys register 6423:$0_{hex.}$ The **CAN_CMD** instruction is also used for this purpose.	
13	Only one SDO can be active at any one time. The state can be monitored with %SW81.	

Continued on next page

Creating the application program, continued

14	If “AUTO” mode is selected on the Magelis HMI, the SPS runs through the speed ramp and transfers the reference value to the Lexium05.	
15	Alternatively, it is possible to control the drive in manual mode. Access to the state machine is also provided (see illustration). The PLC sends data entered on the Magelis HMI directly to the Lexium.	

Connect the PLC to the PC and download the program

1	Define the connection to the controller (PLC) In this example we use COM1.	
2	Connect the PLC to the PC For it to work, the appropriate programming cable must be connected to the PLC.	
3	Transfer the user program to the PLC. Connecting up triggers an automatic check that the application program is the same as the one in the PLC. If it is not, a download or upload is offered. If download is selected, you must click OK to confirm the run-> stop change and overwriting the existing program.	
4	After the download the PLC is in STOP mode. You must click the START button to start the program. The application runs.	

HMI

Introduction

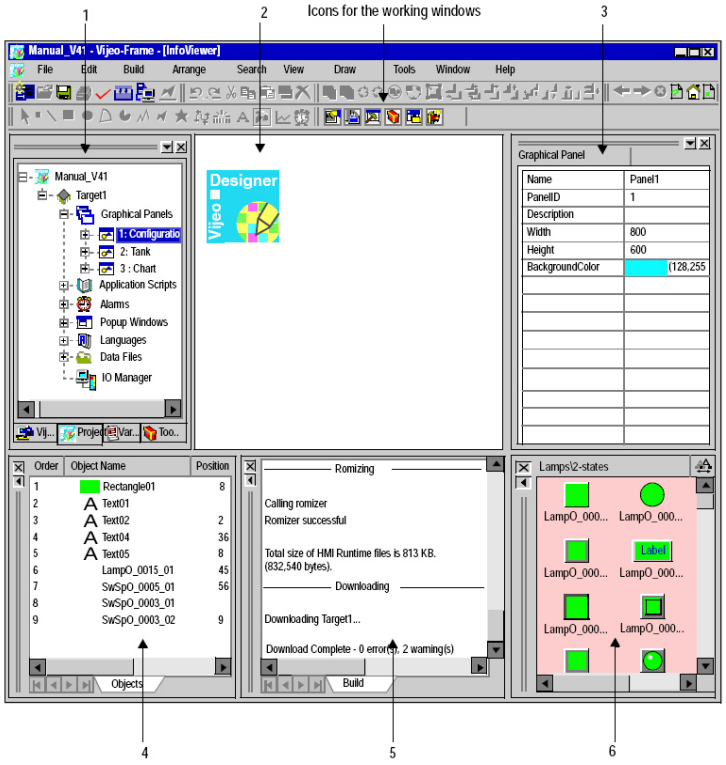
This section describes how to set up the screens for the Magelis HMI. Vijeo Designer is the software used.

Proceed as follows to integrate the HMI:

- Create a new project
- Specify the hardware
- Attach the new driver
- Specify the communication settings
- Set up new variables
- Set up a new screen
- Example of numeric display
- Properties window
- Animation settings
- Check the project and download it

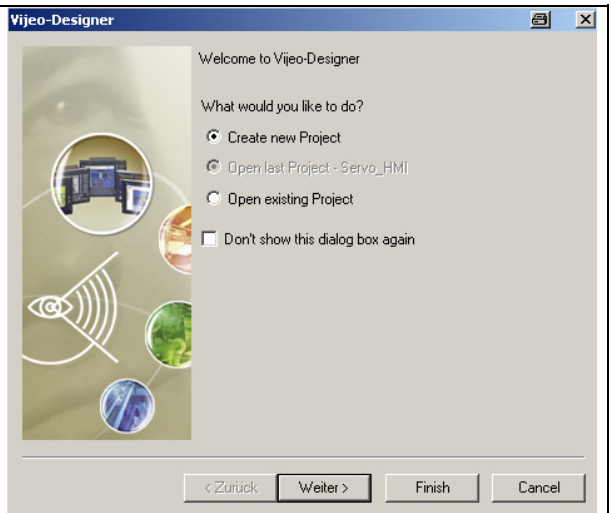
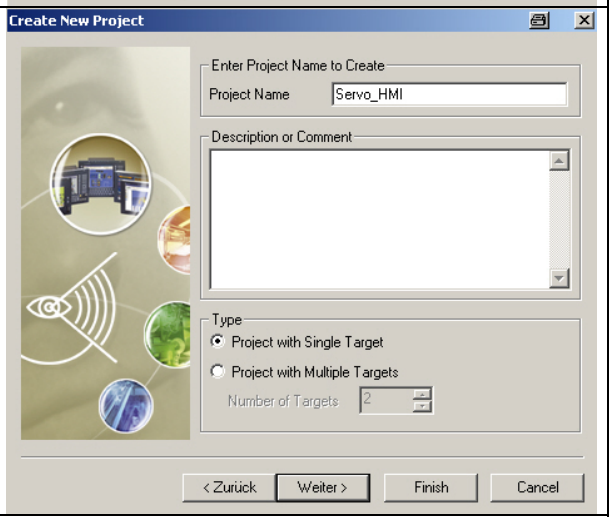
Vijeo Designer environment

The Vijeo Designer environment consists of:

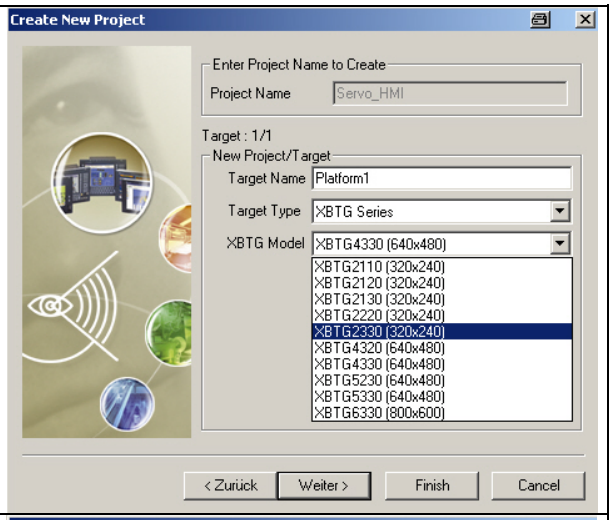
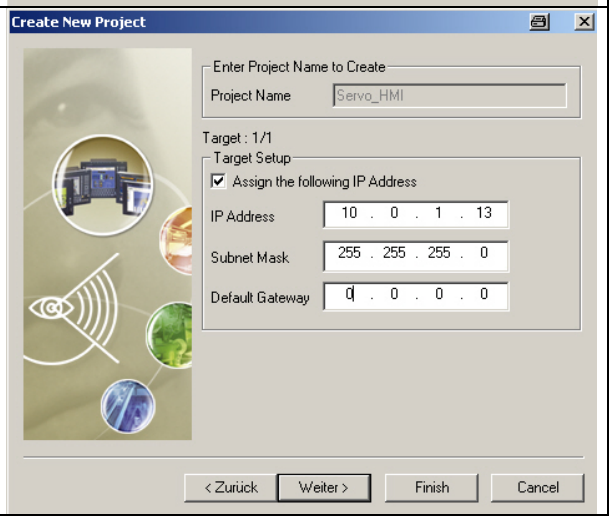


1 Navigator
2 Information display
3 Inspector
4 Data list
5 Feedback area
6 Toolbox

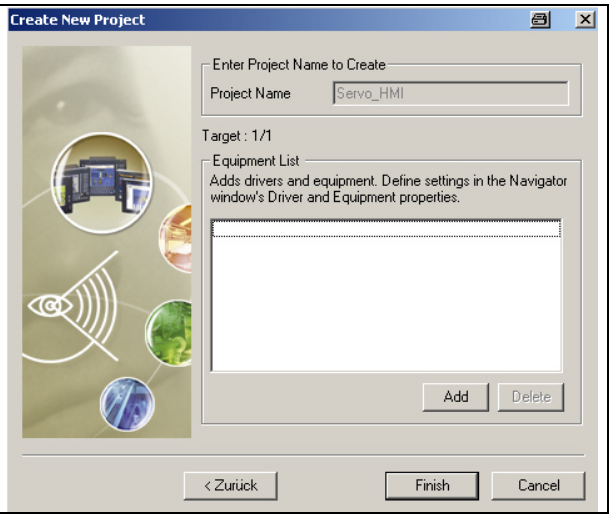
Create a new project

1	Start up Vijeo designer and select “Create new project”. The following steps appear automatically.	
2	Assign a project name: e.g. Servo_HMI	

Configuring the hardware

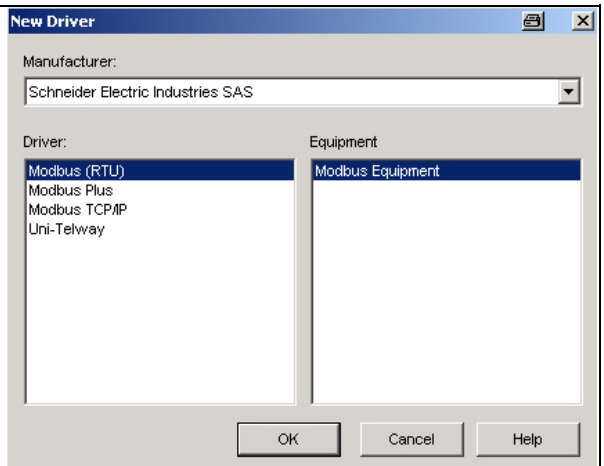
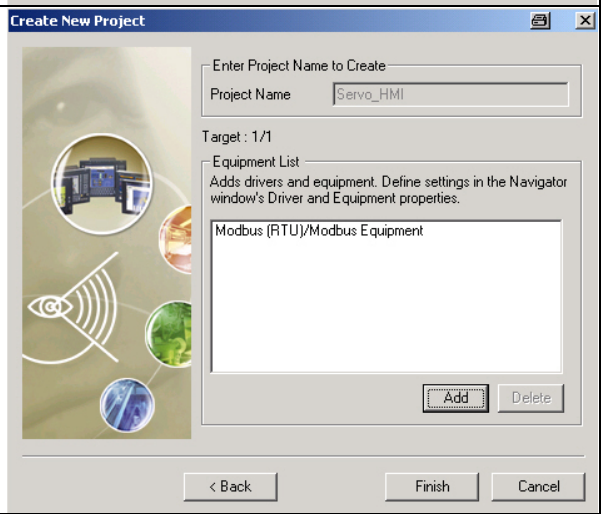
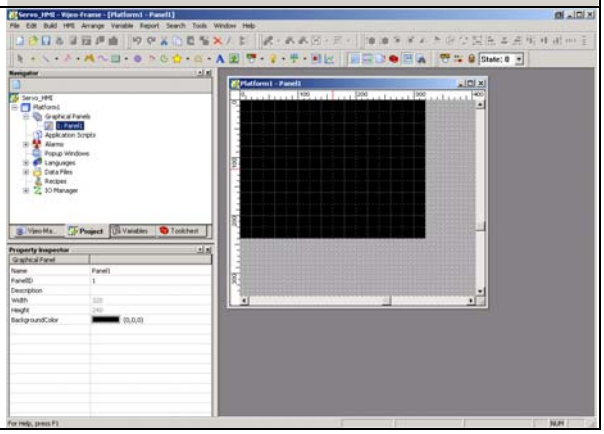
1	Select the target device used Target name: “Platform1” Target type: “XBT –G Series XBT-G Model: “XBT-G2330”	
2	Enter the Ethernet address for the target device	

Attach the new driver

1	Attach the new driver with “Add”	

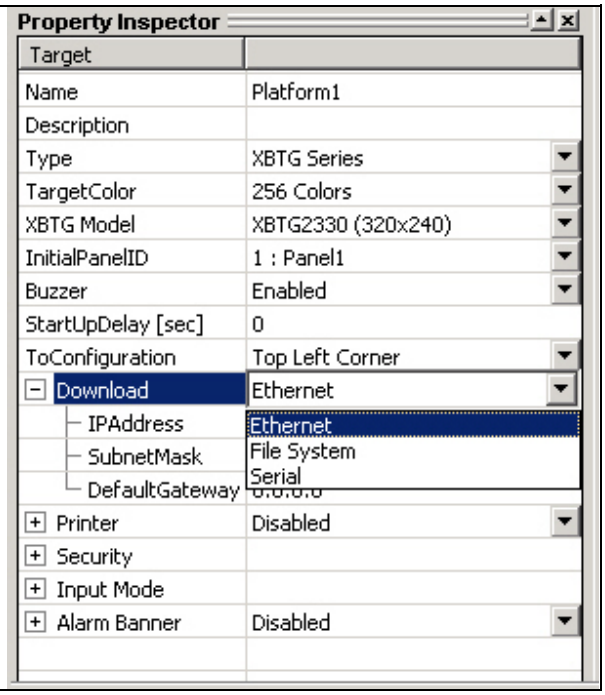
Continued on next page

Attach the new driver, continued

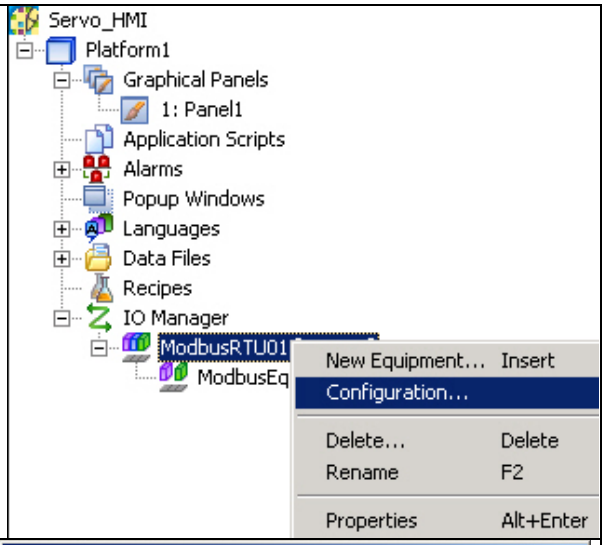
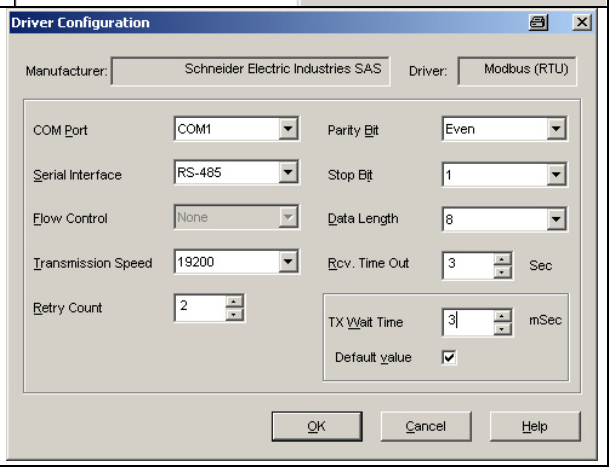
2	**Manufacturer:** • "Schneider Electric Industries SAS" **Driver:** • "Modbus (RTU)" **Equipment:** • "Modbus Equipment"	
3	The new driver is attached	
4	New project screen	

Continued on next page

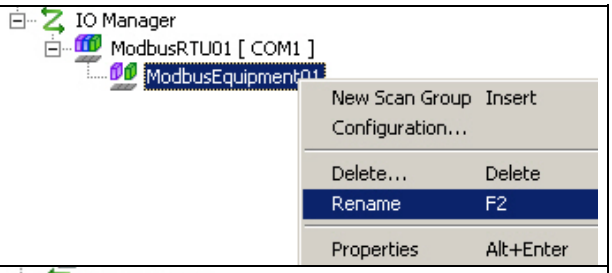
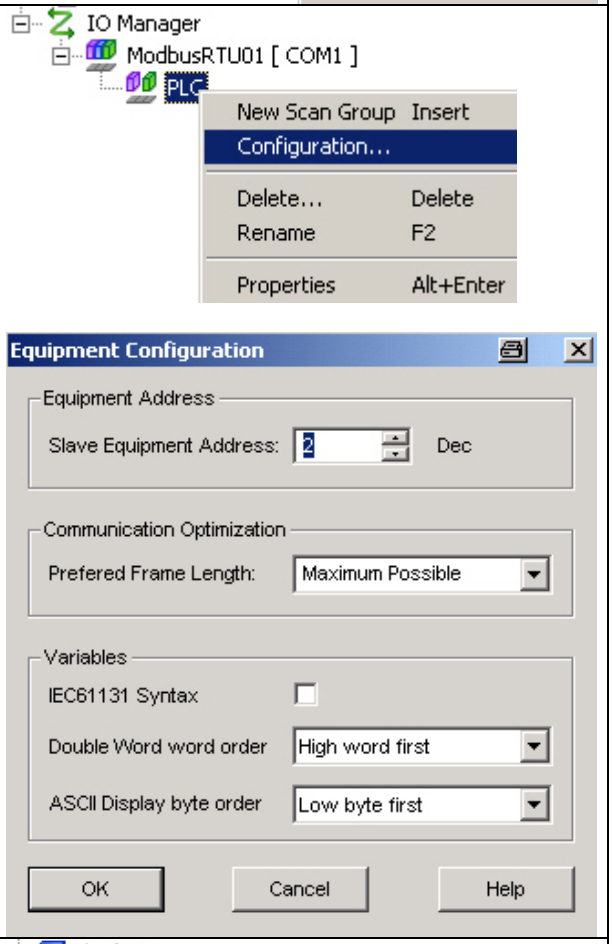
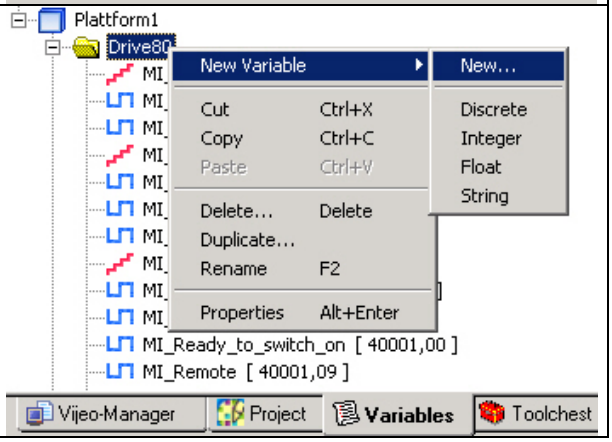
Set up the connection between PC and Magelis

1	Select download setting for the connection between PC and Magelis. The Ethernet connection can also be selected as an alternative to the serial connection.	

Configure the driver

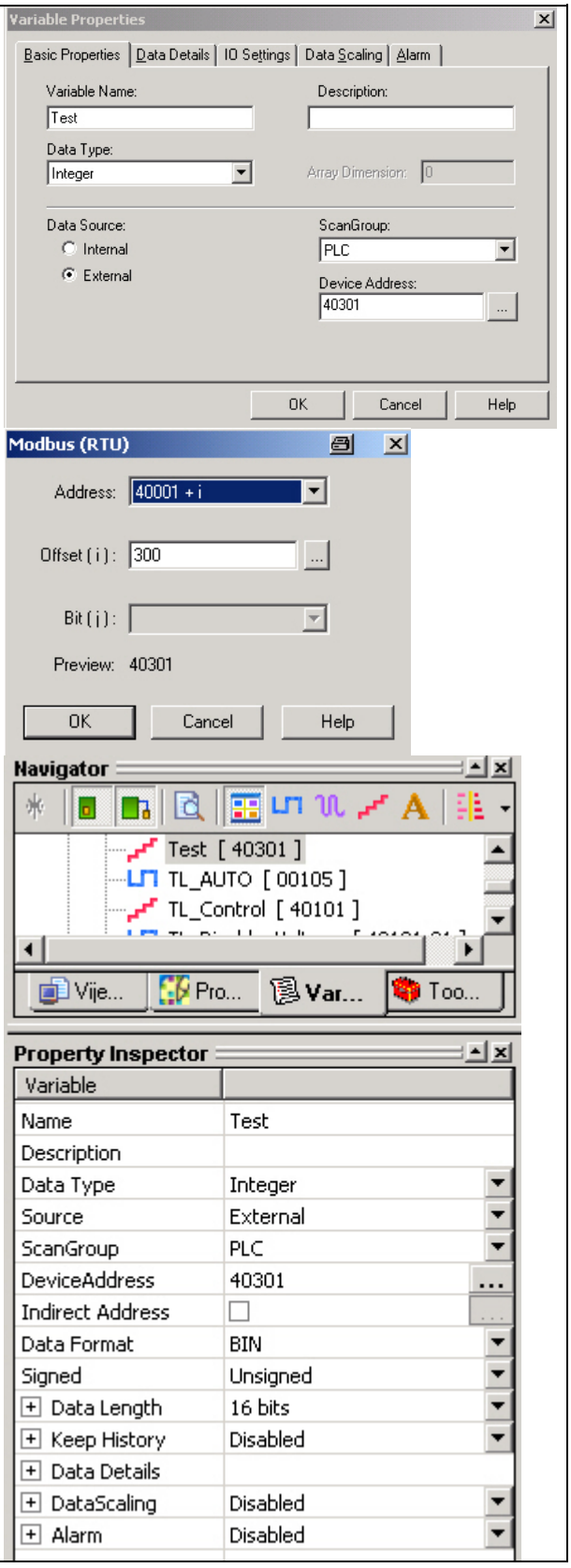
1	Configuring the Modbus driver: I/O Manager -> ModbusRTU01 -> Configuration....	
2	Driver configuration: • COM1 (RS485) • Even • 8 data bits • 1 stop bit • 19200 baud The configuration must be the same as in the PLC (Twido Port 2).	

Configure the communication device

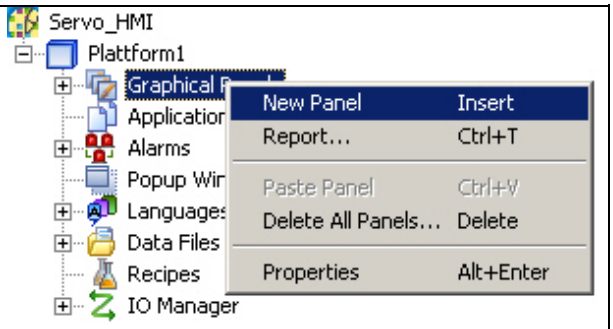
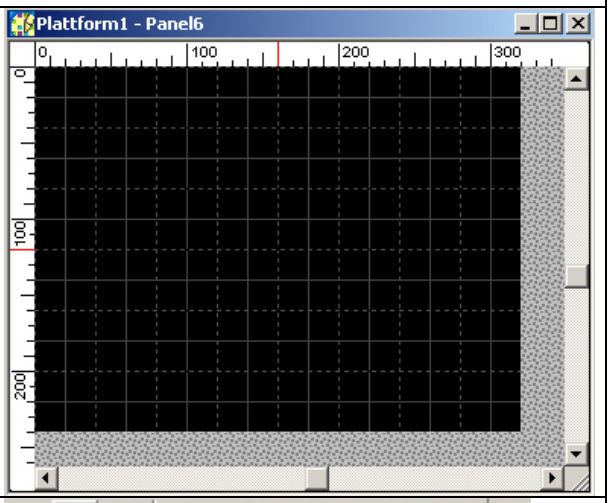
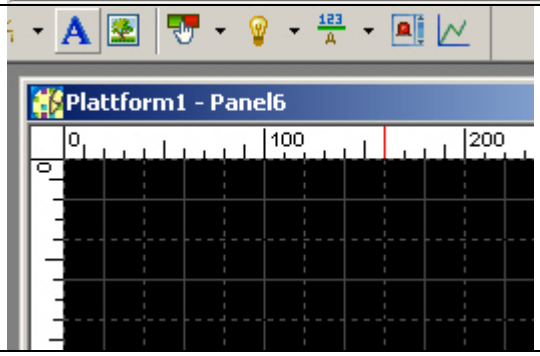
1	Rename the communication device "PLC"	
2	Equipment configuration for the communication device. The Modbus address is “2”, the same as the SPS configuration (Twido Port 2).	
3	Set up the new variable.	

Continued on next page

Configure the communication device, continued

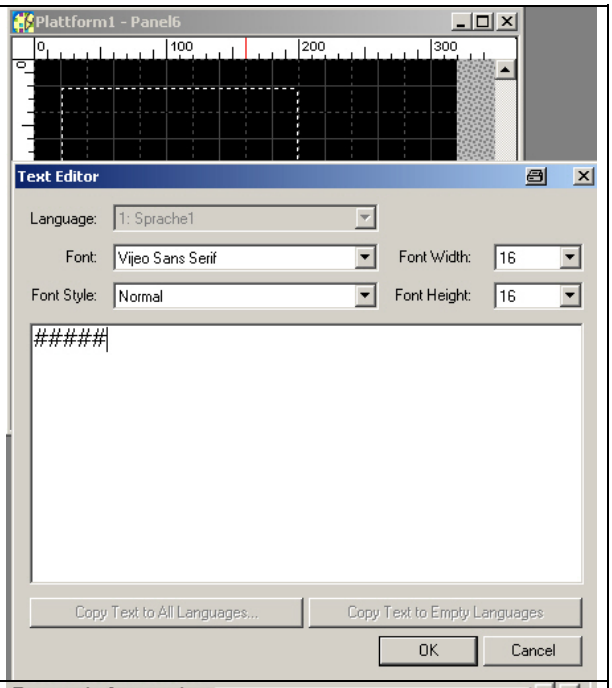
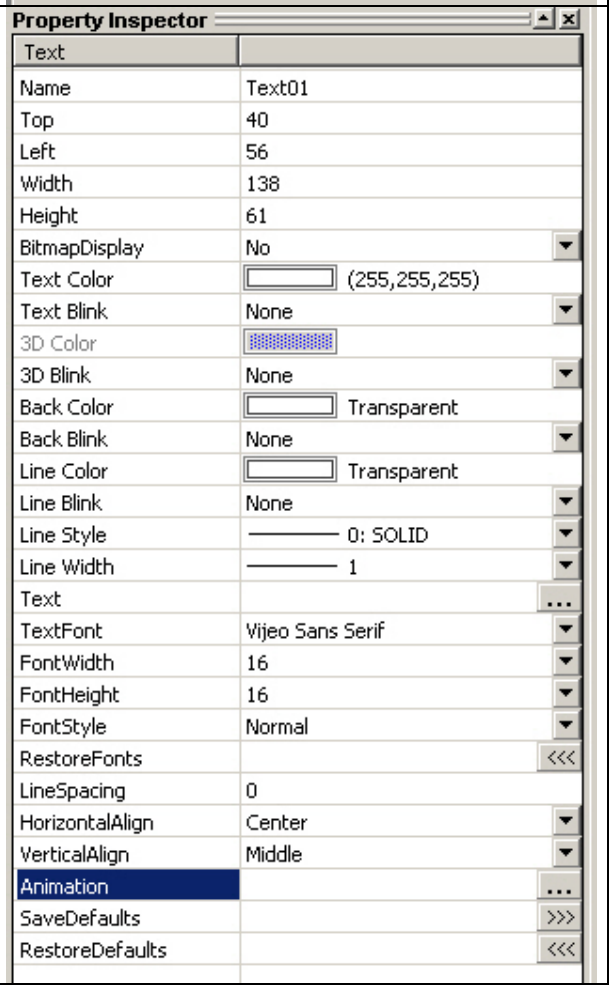
4	Specify the variable properties: • Name • Data Type • Source - External - PLC • Address in the PLC Valid integers are: 30001 + i and 40001 + i Valid discrete values are: 00001 + i and 10001 + i and 30001 + i, j and 40001 + i, j **Example:** PLC %M106 HMI 00001 + 106 **=> 00107** PLC %MW207 HMI 40001 + 207 **=> 40208** PLC %MW100 Bit 5 HMI 40001 + 100. 5 **=> 40101.05**	

Create new screen

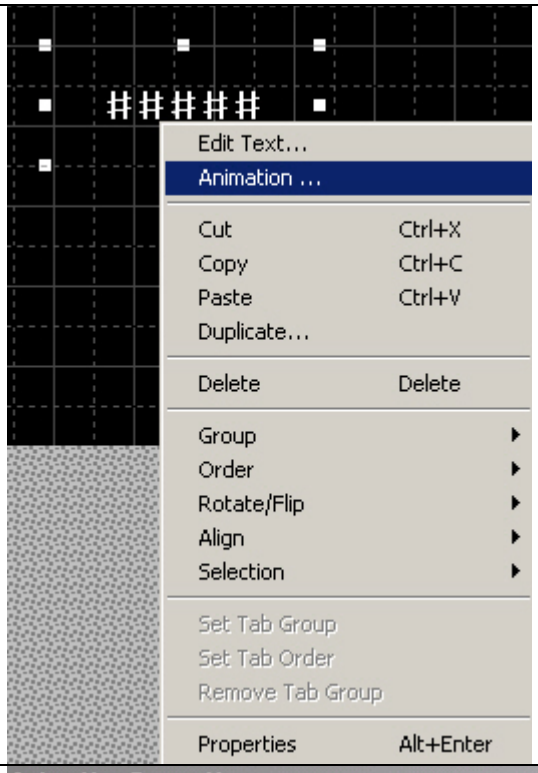
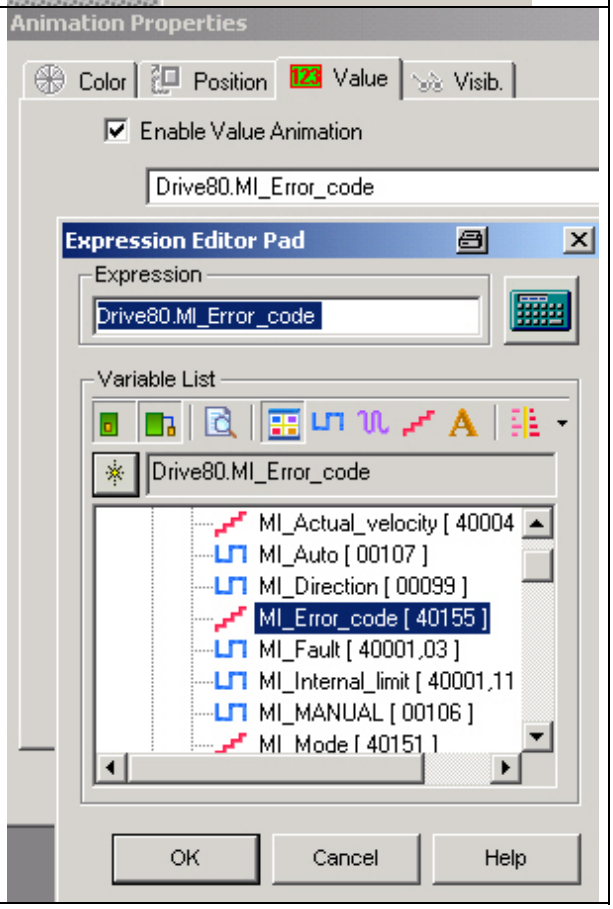
1	Create a new screen	
2	Blank screen	
3	Example: Enter text Selection from the menu bar. Various icons and elements are available in the menu bar and the toolbox.	

Continued on next page

Create new screen, continued

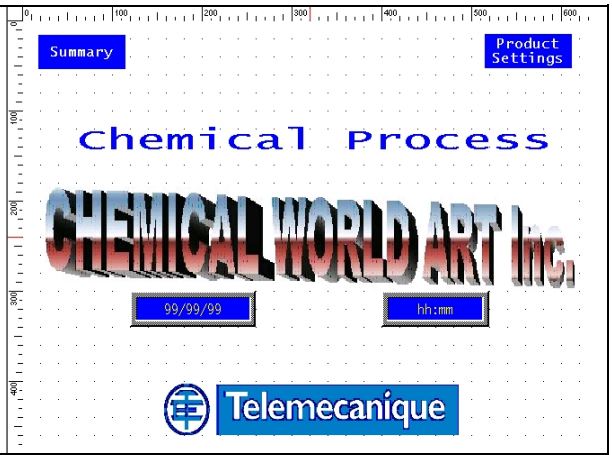
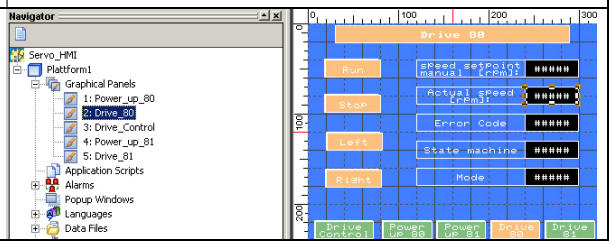
4	Example: Adjust the text Specify the size and enter the text contents, the font etc.	
5	Display of text element properties, where you can change the position, size, colors etc.	

Animation

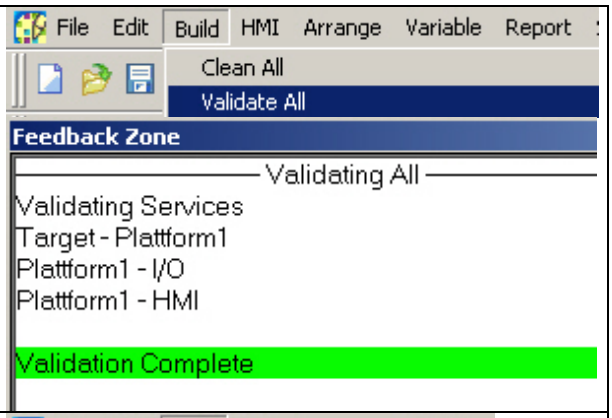
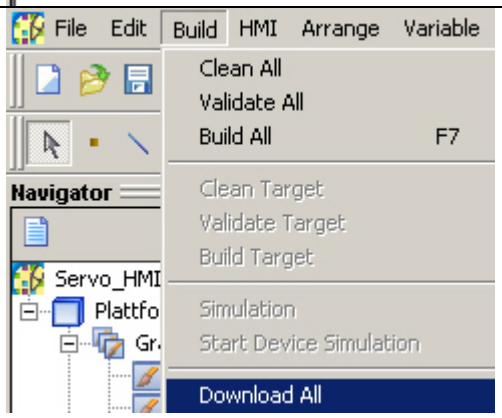
1	To select the **Animation** function, click on a text element and then click the right mouse button. You can also do this via the Properties page (described above).	
2	Animation properties: • Color • Position • Value • Visible After activation you can select a variable for the value animation and the display format.	

Continued on next page

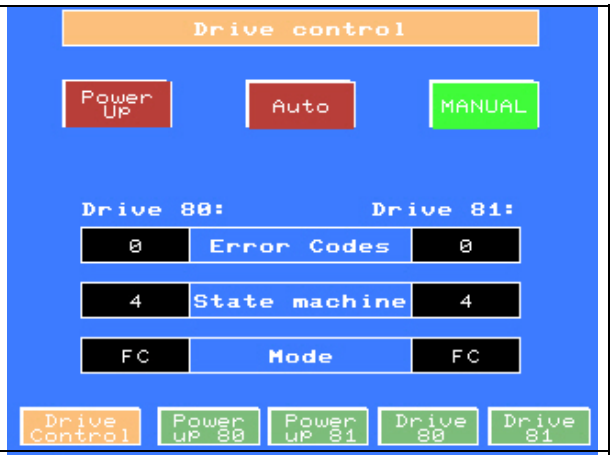
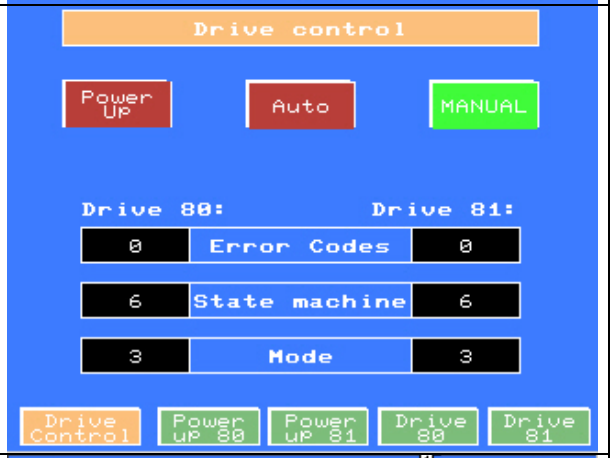
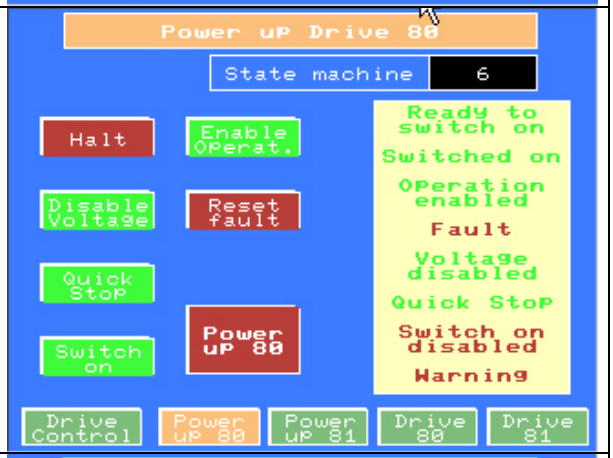
Animation, continued

3	Here are a few examples of text, text boxes and graphics:	
4	Completed screen with all properties for animation and actions.	

Analyze the project and download it

1	"Validate all" can be used to analyze the project. The System messages window lists information. The same applies to the "Generate all" menu item.	
2	Download the project to the Magelis (HMI): Select the project in the navigator. Use the menu item "Download All", reached via the right mouse button or the "Build" menu, to transfer the application to the connected HMI. The connection selected at the start (serial or Ethernet) is used. The Vijeo Designer package includes a serial cable.	

Display pages

1	The “Drive control" screen is the home page. The lower buttons are used to select the other pages. After power restoration to the whole system the Lexium05 controls are in state “4” (Ready to switch on) and mode “FC” (Mode = -4).	
2	Press the “Power Up” button for approx. 2 seconds. This changes the control to state “6” (Operation enable) and the Speed mode (Mode = 3) If you select “Auto" it runs through a specified speed profile.	
3	The “Power up drive 80/81” screen gives access to the state machine. You can set the individual bits of the control word. In addition, it displays the individual bits of the status word.	
4	If “Manual” is selected you can control the drive from the “Drive 80/81” screen i.e. start, stop, change speed, change direction.	

Appendix

Detailed Component List

Type/software	Description	Revision/ version
ABL7RE2403	POWER SUPPLY 240 V AC 1PH 24 V DC 3 A	
VCF02GE	EMERGENCY OFF MASTER SWITCH	
TWD LMDA 40DTK	Modular devices, 40 on-board I/Os	
TWD NOZ OD 485D	RS485 serial connection module	
TWD NCO1M	CANopen master module	
TWD AMI 2HT	Analog module with 2 inputs	
TWD AMO 1HT	Analog module with 1 input	
STBPDT3100	POWER SUPPLY 24 V DC PDM STAND	
STBNCO2212	BUS COUPLER CANopen NIM STAND	
STBXCA4002	CONFIGURATION CABLE RS232 SUBD/HE13 2M	
STBXBA3000	BASE I/O TYPE3 27 MM	
STBXBA2200	BASE PDM 18 MM	
STBDRC3210	MODULE 2 OUT RELAY C 24 V DC/2 A	
STBACI1230	MODULE 2 CHAN 12-BIT INSULATED 0...20 MA	
STBDDI3610	MODULE 6 IN 24 V DC SINK 2-WIRE 0.1 MS FIX. S	
STBXMP1100	BUS TERMINATOR MODULE ISLAND BUS	
STBACO1210	MODULE 2 CHAN. 12-BIT 0...20 MA	
STBXTS2100	CONNECTOR I/O 6 CONN. CAGE CLAMP TERM. (20)	
STBXBA1000	BASE I/O TYPE1 13.5 MM	
STBXBA2000	BASE I/O TYPE2 18 MM	
STBXTS1100	CONNECTOR I/O 6 CONN. SCREW TERM. (20ST)	
STBXTS1110	CONNECTOR I/O 5 SCREW-TYPE TERM. CONN. (20)	
STBXTS1120	CONNECTOR NIM 2 SCREW-TYPE TERM. CONN. (10)	
STBXTS1130	CONNECTOR PDM 2 SCREW-TYPE TERM. CONN	
XBTG2330	Color TFT LCE 256 colors 5.7 inch	
XBTZG915	Programming cable	
XBTZG999	Cable adapter	
LXM05AD10M2	Lexium05 230V/1F 750W	
SER3683L5S	Servo motor	
GEA2M0AAAA003	Motor cable - 3m	
GEA2EAAAAA003	Encoder cable - 3m	
TWD SPU 1001 V10M	TwidoSoft software incl. cable	V3.2
STBSPU1000	ADVANTYS software incl. RS232 cable	V1.2
VJDSPULFUCDV10M	Vijeo Designer software	V4.2
	PowerSuite	V2.8

Component Features

Twido PLC

TWD LMDA 40DTK

The modular series consists of five power bases having different processing capacities and different numbers and types of inputs and outputs (20 or 40 inputs/outputs with screw-type terminal connections or HE10 connectors, with sink/source transistor or relay outputs). The power bases can be fitted with all I/O modules (18 digital and analog modules). The supply voltage for all Twido Modular models is 24 V.

The Twido Modular controls offer:

- Modular adaptation to application requirements. The power bases can be fitted with up to 4 (or 7) digital or analog I/O modules (depending on the version).

- The large number of different extension options offers the user a degree of flexibility that is normally achieved only with larger control platforms. The TWD LMDA Twido modular controls can be fitted with the optional storage modules and real-time clock modules at the same time and with a display/display module or a serial connection. These modules can all house a second RS485 or RS232C communication terminal.

- Twido Modular is also extremely flexible in terms of wiring. There are a number of options: for example removable screw-type terminal strips, spring-loaded terminal and HE 10 connectors to ensure rapid reliable connection. The TwidoFast rapid wiring system enables wiring to be prepared by combining the modules that are fitted with HE 10 connectors to be combined with:
  - prefabricated cables with open ends for direct connection to sensors/actuators,
  - TwidoFast-Kits (cables and Telefast terminal block).

Local digital I/O:	24I/16O
Local analog I/O:	1I, 0-10 V 8 bit (512 points) 1 potentiometer on front panel. Range 0-1023 points
Application memory:	3000 instructions 6000 with memory card
Integrated interface:	Modbus RS485
Programming:	TwidoSoft

TwidoSoft

TWD SPU 1001 V10M programming software

TwidoSoft is a graphical development environment for creating, configuring and administering applications for the Twido series of controls. TwidoSoft is a 32 bit software package for Microsoft Windows 98SE, Windows 2000 or windows XP. The software is presented in the familiar standard windows environment with windows, toolbars, context menus, informative texts, context-sensitive online help and more.

It offers the application developer a wealth of functions to make programming and configuration much easier:

- The programming languages are Instruction List or Ladder Language. Both these languages are reversible.
- Application navigator able to display a number of windows at once, making it easier to configure the software.
- Editors for the most important programming and configuration tasks.
- Cut, copy and paste functions.
- Symbolic programming.
- Management of cross-references.
- Duplication of applications.

In online mode, TwidoSoft normally covers the following functions:

- Real-time animation of program elements and/or data.
- Control diagnostics.
- Monitoring of memory assignment by the application.
- Loading and unloading of programs.
- Storage of programs in the optional EEPROM memory modules.

Lexium05

LXM05AD10M2 Drive Control

Power output:	From 0.75 kW (Construction size 1)
Voltage types:	230 V ~, single-phase
Fieldbus interface:	CANopen
Signal interface:	with two analog +/- 10 V inputs and 8 digital inputs/outputs
RS 422 interface:	for pulse/direction or A/B signal inputs or encoder simulation
Operating mode:	Current control, speed control, electronic gears, point-to-point operation, speed profile, referencing, manual running

Servo motor

SER3683L5S

Rated power:	0.6 kW
Rated speed:	12,000 rpm
Rated continuous torque:	0.48 Nm
Continuous static torque:	0.75 Nm
Max. torque:	3.0 Nm
Max. voltage:	230 V ~

Power supply

Phaseo ABL7RE2403

Input voltage:	100 to 240 V ~, single-phase, 50/60 Hz
Output voltage:	24 V =
Output current:	3.0 A

Magelis HMI

XBTG2330 Graphic Touch Panel

Display type:	LCD TFT 256 colors
Display size:	5.7" (320x240)
Protocols:	Unitelway , Modbus, Modbus TCP/IP
Interfaces:	RS232C/RS485 , Ethernet 10BaseT
Voltage:	24 V = external

Vijeo Designer

VJDSPULFUCDV10M

Vijeo Designer configuration software has a number of parameterization windows that enable a project to be developed quickly and simply and are very user-friendly. Vijeo Designer uses Java scripts that allow process data to be further processed on the XBT G touch panel.

These are some of its functions:

- Navigator,
- Library of animated graphic objects,
- Online help,
- Display of error reports,
- Display of object characteristics,
- Display of the list of variables.

Contact

Author	Phone	E-mail
Schneider Electric GmbH Customer & Market System & Architecture Architecture Definition Support	+49 6182 81 2555	cm.systems@de.schneider-electric.com

Schneider Electric GmbH
Steinheimer Strasse 117
D -63500 Seligenstadt
Germany